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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Faraday's Discovery

ON Tuesday next Faraday's discovery of benzene, announced a hundred years ago, is to be fittingly celebrated in London by the Royal Institution and associated bodies. A commemorative lecture by Sir William Pope on "Faraday as a chemist" will already have been delivered before this issue is in our readers' hands. On another page a distinguished organic chemist, with the gift of style and exposition one finds nowadays so often allied with the research mind, with which it was formerly regarded as quite incompatible, surveys the effects of Faraday's discovery on chemical theory and the immense industrial developments to which directly or indirectly it has led. So lucid a statement requires no repetition or emphasis; it is best read as it stands. But there are some features of Faraday's achievement which have a very large meaning from the public point of view, apart from all that it means to chemical science, and one purpose of the celebrations, which we trust will be attained, is to make the public in some degree sensible of its material debts to science.

Perhaps the first lesson is the familiar one that the results of research can never be foreseen, and that the greatest are sometimes the most unexpected. Faraday, as our correspondent points out, when he isolated the unknown liquor which proved to be benzene, had no idea of the importance of his discovery—of its effect on the development of organic chemistry, and the wide range of industrial results to follow. This standing on the verge of discovery, not knowing what may come forth at any moment, while it is the constant fascination of the research vocation, is also its chief weakness to the purely commercial mind. The man who finances research expects definite results and usually wants some guarantee of them beforehand. No such guarantee can be given, and one need of to-day is the education of commercialists and financiers out of this entirely false attitude.

A second lesson of Faraday's discovery is the debt which mankind owes to the solitary workers who age after age have dedicated their lives to the search for truth and knowledge. It is the work of men like Faraday that really makes human progress possible; it is a rebuke to the many crude talkers of the day who imagine that an upheaval here or a revolution there can settle everything in a moment. The real problems of life are not settled in that summary way. They are only to be settled in the spirit in which the scientist approaches his work, by sustained and concentrated effort, by the patient accumulation of knowledge, by discoveries in one generation which enable the next to start a few points onward. The theorists who would settle all our complicated social problems on the spot can learn no more profitable lesson than that of lives like Faraday's, which have been given to the search for truth and the service of mankind, and which have looked for the only possible solutions in the progressive conquest of knowledge over ignorance.

Chemistry and the Textile Industry

FEW appreciate the part which chemistry and chemical engineering play in the textile industry. Only the other day we learned from the manager of a rag factory in the North of England that even this branch of the industry is faced with problems for the solution of which it must look to an exact knowledge of chemistry and chemical engineering. For several years now fabrics have been woven consisting of wool interlaced with stripes or threads of artificial silk. After use these fabrics find their way to the rag factories, where they are treated and sorted according to quality, texture and shade. It is, however, important to remove the silk stripes without impairing the quality of the wool, if the full market price is to be realised for the rags. Two separate immersions in sulphuric acid of a specific strength are known to destroy—presumably by means of a carbonisation process—the artificial silk, leaving the wool practically unaffected. But this method is expensive, and on the whole, it is doubtful whether such treatment is remunerative when labour, cost of acid, shaking, and loss of weight are

taken into consideration. Any attempt at devising a less expensive mode of treatment seems futile unless regard is had to the quality of the artificial silk and the process by which it has been prepared. The nitro and cuprammonium processes are not now much used. Artificial silk to-day is largely manufactured by the viscose process, and it is the destruction of silk of the latter character which the textile chemist seeks to effect inexpensively, by a method which will not adversely affect the quality of the wool.

It is also known that large quantities of rags are received from the Continent, which have been dyed a dark shade, and for certain purposes the colour has to be removed. We understand that "Dekalin" is an excellent decoloriser for this purpose, but that the supplies can only with difficulty be secured. "Dekalin" is a mobile, colourless liquid, prepared by the hydrogenation of naphthalene, under pressure, at a temperature of 200 deg. C., in the presence of a suitable catalyst. It is known that special plant for the manufacture of "Dekalin" was erected some time ago at Rodleben (Germany), but for some reason or other exportation to this country is forbidden. Here is an opportunity for our organic chemical works to step into the breach, and provide a product which has an extensive use, not only as a decoloriser, solvent, and chemical cleanser, but as a turpentine substitute and as a motor fuel. We hope that such an opportunity for an extension of our organic chemical industry will not be lost.

Hydrogenation of English Coals

In exploring the avenues whereby we may hope some day to find a solution of our liquid fuel problems, there is no prospect which is quite so attractive from the scientific point of view as that of being able to draw upon our exceptional coal resources and to effect a metamorphosis which would satisfy the whole of our requirements in the way of oils and lighter spirits. It is more than fifty years since Berthelot first succeeded in converting natural coal into oils by hydrogenation, but Berthelot did not live in an age of oil so that his brilliant conception and work failed to meet with much response on account of the fact, no doubt, that commercially there was no necessity for it. The problem of keeping abreast of the ever-increasing demand for liquid fuels is one which must continue in the main to prove of concern to the western European nations many of which are abundantly endowed with coal but which possess little in the way of raw material for the production of any great quantities of liquid fuel at an economic cost. Coal, we well know, will give us primary liquid fuels which by subsequent treatment may be caused to yield end products more or less in accordance with our requirements, but the processes which are technically the easiest, such as carbonisation in its various forms, possess the inherent objection that they are dependent upon the limited demand for solid or gaseous products, so that such processes are never likely to be able to do more than bring a certain amount of alleviation to the situation as a whole. It is undoubtedly the extraordinarily ambitious task of the complete liquefaction of coal which seems to hold out the promise of a true solution, but it would appear to be a consummation which is scarcely likely to benefit the present generation.

In our issue of last week we drew attention to the important work which has been conducted by Professor A. W. Nash at Birmingham University for the past three years with English coals. The interest in this work mainly lies in the fact that it is, so far as our memory serves us, the only attempt which has been made to apply the process to English coals, and it has definitely proved that they can quite readily be converted substantially into the liquid state. Professor Nash states that the liquid he has obtained differs from ordinary crude petroleum in that it contains relatively small proportions of substances not occurring in crude oil, and when these are removed the residue consists entirely of hydrocarbons, the basis of all fuel oils. The results obtained from a variety of English coals are certainly encouraging, in one case a yield of 130 gallons of liquid products being yielded by a ton of any ash-free coal. In viewing the whole problem one cannot, of course, afford to neglect the fact that Dr. Bergius, in spite of the progress he has made from the scientific standpoint, has not yet succeeded in adapting the process on a commercial scale after twelve years' research. Again, there is a significant statement in the recently published English edition of Professor Franz Fischer's book to the effect that hydrogenation of coals can at best produce high-boiling oils and only minor proportions of low-boiling products. In other words, hydrogenation yields a small portion of oily products and a large portion of solid products which are soluble in certain solvents. If these solvents are added to the coal beforehand it appears to be liquefied, although in reality it is only rendered soluble to a large extent.

The Sulphur Factor in Fertilisers

We have on previous occasions drawn attention to opinions expressed in connection with the employment of sulphur for soil treatment, and there would certainly appear to be a good deal of evidence to support the suggestion that sulphur deficiency may in certain cases be responsible for indifferent results which are apt to be attributed to other causes. It must be admitted, however, that the whole situation as regards both the fertilising action and ultimate effect of sulphur is indefinite, and it is, perhaps, scarcely possible to agree as yet with the assertion that in some soils sulphur may be a limiting factor, and that crop increases which have followed the application of superphosphates and sulphate of ammonia are due to the sulphur content rather than to the phosphoric acid or nitrogen or such materials.

One of the most persistent advocates of the utility of sulphur for soil treatment is Dr. H. Clay Lint, of the Texas Gulf Sulphur Co., and in a recent issue of an American contemporary he brings out some new aspects of the problem. In dealing with the subject of acid phosphate Dr. Lint states that while of the several fertilising elements contained in this substance phosphoric acid is undoubtedly the most influential, it is seldom that due credit is extended to the sulphur content. The evidence from soil analysis is that sulphur is usually contained in lesser amounts than

phosphorus, the relative amounts of sulphur removed by crops is variable, and even in those cases where the sulphur contained in the crop is less than the phosphorus the ratio of the former to the latter is generally greater than their relative amounts in the soil, so that under equal conditions sulphur should become a limiting element of fertility before phosphorus. Dr. Lint points out that 16 per cent. acid phosphate contains 7 per cent. of elemental phosphorus as against 10 to 11 per cent. of elemental sulphur, and he concludes that the chief reason why a shortage of sulphur is not more in evidence in some soils is due to the replacement effected by the sulphates contained in certain fertilisers. So far research does not appear to have been carried sufficiently far to establish the full extent of the sulphur and phosphorus relationships; but it is claimed that the uniformly satisfactory results from acid phosphate tend to prove that a part of its superior merit is attributable to the available sulphur which it carries. Accordingly, we are told that not only is sulphur an essential plant food, the necessity for which is increasing as soils are depleted, but by its application in conjunction with phosphorus a better efficiency of the latter is promoted.

The Application of Coal Tar Products

THE number of technical chemists who find themselves directly or indirectly associated with, or interested in, the products derived from coal tar continues to expand, and it is to be trusted that we are reaching a stage when some definite applications may be found for those products, by no means few in number, for which few industrial uses exist. As one well-known authority has stated, it is inconceivable that our chemists and chemical manufacturers will continue to allow such products as these to be wasted in, say, covering roads; but at the moment it is, of course, a question of supply and demand, and it is to be feared that it will be a long time before the applications reach such a stage of development that the roads have to go short.

In considering the opportunities which exist for a continuance of systematic research work one might take as an example acenaphthene and phenanthrene, two compounds concerning which we recently had an inquiry as to the extension of their applications. Comparatively little work has been done on the chemistry of acenaphthene and its derivatives, although a few vat dyes are employed, while from phenanthrene only one dyestuff, of no very material importance, has ever been marketed. It is understood, however, that work with these compounds is being followed up, particularly in connection with the preparation of synthetic tannins and resins, so that they may assume some greater importance in the future. One of the outstanding considerations which one has always to take into account when dealing with coal tar products is that although some definite substances may be known to be present in the tar it is frequently easier to obtain them from the synthesis of other primary tar constituents. It is, accordingly, the most delicate problems such as this which add to the mystery and complexity of this wonderful branch of chemistry, and which are themselves sufficient answer to any who contend that our progress might be more rapid.

Progress in X-Ray Testing

IN a note on "X-Ray Testing in Foundry Practice," published in the Metallurgical Section of THE CHEMICAL AGE on June 6, attention was drawn to current methods of testing which involve the destruction of the material and must therefore be applied to test bars and not to the castings themselves. Nevertheless, it was pointed out, the greatest difficulties with which the founder has to contend are concealed in the casting, and it was suggested that, although X-Ray testing may be impracticable as a routine method, it might be of great value in the preliminary stages of planning composition, melting, and moulding methods. The view of the British Cast Iron Research Association is that, although a single company might not be able to put down an elaborate plant for this purpose, co-operation might be arranged between the Association, the Radiological Research Department at Woolwich, and the National Physical Laboratory at Teddington.

At a recent inquiry into a railway accident caused by the fracture of the tyre of a driving wheel, attention was drawn to the progress made in the X-Ray examination of metals in America, where the limit of penetration achieved is three to four inches. This, instead of being vastly ahead of British achievements, is really not quite so good. In his recent Cantor Lecture, Mr. V. E. Pullin, Director of Radiological Research at Woolwich, was able to announce that in his Department four inches of steel had been clearly penetrated. It is now possible, we understand, slightly to exceed this figure.

Points from Our News Pages

The Calendar

1925		
June 16	Royal Institution, Chemical Society, Society of Chemical Industry and the Association of British Chemical Manufacturers: Faraday Benzene Centenary. Reception of Delegates. 11 a.m.	Royal Institution, Albemarle Street, London.
	Banquet. 7 p.m.	Hall of the Goldsmiths' Company, Foster Lane, Cheapside, London.
16	Mineralogical Society: Papers by Dr. A. Hutchinson, H. E. Buckley, W. S. Vernon, Dr. E. Spencer, Dr. R. Campbell, J. W. Lunn. 5.30 p.m.	London.
17	Royal Microscopical Society: Annual Exhibition of Microscopic Pond Life. 7.30 p.m.	20, Hanover Square, London, W.1.
18	Chemical Society: Papers by H. Phillips, F. R. Goss, C. K. Ingold, and F. H. McDowall. 8 p.m.	Burlington House, Piccadilly, London.
23	National Physical Laboratory: Annual visit of inspection. 3 to 6 p.m.	Teddington.

A Hundred Years of Benzene

Faraday's Discovery and Some of Its Results

In this article, which appropriately precedes the Faraday centenary celebrations next Tuesday, the author reviews the effect on chemical theory of Faraday's isolation of benzene, and indicates the great commercial and industrial developments which it made possible.

JUST one hundred years ago Faraday announced that he had isolated a hitherto unknown liquid and described some of its properties. He found it among the products from the compression of oil gas. Although most of his experiments were prompted by purely scientific motives, things of practical utility were sometimes comprehended in his outlook. In this case his keen insight had brought to his mind the possibility of the production of an illuminating lamp which employed compressed oil gas and which would prove safe in use. His attempts in this direction were not very successful. Even had they been, and had his work on the liquefaction of gases on which he had long been engaged culminated in more important results, even then, and particularly when viewed in the light of our present knowledge, the discovery of benzene would still have overshadowed all else. Faraday, of course, had no idea of the significance of his discovery, nor could he have guessed the dominating role which was to be played in organic chemistry by the compound whose existence he had brought to light. The developments in the chemistry of benzene came after his honoured career had come to a close, but to him belongs the imperishable distinction of being the first to disclose the existence of benzene. He was the pioneer who wrested from the earth this gem, the Koh-i-noor of organic compounds.

Faraday's discovery was followed twenty-three years later by another discovery whose importance can hardly be overestimated. In 1848 Hofmann, and his brilliant pupil Mansfield, isolated benzene from coal tar, a by-product which has been the commercial source of benzene ever since. The work of Mansfield laid the foundation of a large section of our organic chemical industry by showing how benzene could be obtained in quantity and thus be made available for all the multitude of uses to which we put it to-day.

Benzene in Chemical Theory

For three-quarters of a century benzene has occupied the premier place of interest of all organic compounds. The scientific literature concerning it and its derivatives has reached enormous dimensions. The question of its constitution has been the dominant controversy in organic chemistry for over half a century. Practically every theory of atomic or molecular structure has been applied to the solution of the problem as well as to those more or less directly connected with it, or arising out of it, such as those of substitution, isomerism, and the relation between colour and constitution. The "benzene question" has attracted many of the most brilliant intellects our science has known. It was not till 1865 that any definite ideas were formulated. In that year Kekulé advanced his famous hexagonal formula in order to account for the isomerism of the benzene derivatives. This was followed in 1867 by the "diagonal" formula of Claus. Two years later Ladenburg brought out his stereometric formula in which the six carbon atoms were arranged at the six corners of a regular prism. In 1887 Baeyer and Armstrong proposed the "centric" formula. This was a modification of the Claus formula, the difference being that the fourth carbon valency was merely "directed" towards the carbon atom diagonally opposite to it and not directly connected with it as in the Claus formula. When Thiele propounded his theory of conjugation and partial valencies in 1899 it was immediately applied to benzene and gave a very satisfactory solution to the problem. In addition to the prism formula of Ladenburg stereometric formulæ for benzene have been proposed by Kekulé, Baeyer, Marsh, Vaubel, and Sachse. All the above formulæ assumed a static arrangement of the atoms and valencies. Kekulé himself applied the dynamic hypothesis to the valencies or bonds connecting carbon atoms in the ortho position. Knorr suggested the oscillation of the hydrogen atoms between neighbouring pairs of carbon atoms, while Collie went further and assumed a regular relative change in the positions of the carbon-hydrogen groups. As recently as 1922 Ingold has revived the old Dewar formula, suggesting that it might be a tautomeric form of the benzene molecule.

The development of the electronic theory of valency has again brought the question into the forefront of chemical controversy, the chief protagonists being Stark, Kauffmann, Pauly, and Fry, all of whom have proposed electronic formulæ. It was quickly recognised that the brilliant researches of Laue, the Braggs, and Debye and Scherrer on X-ray analysis had placed a very powerful weapon in the hands of those who were seeking to solve the mysteries of atomic and molecular structure. This very beautiful method has been applied to benzene by Debye and Scherrer who have given what may be accepted as final proof that the six carbon atoms in benzene lie in one plane and that the benzene ring is a regular hexagon, a result which harmonises with the researches of Bragg on the atomic structure of carbon in the mass. The question of the distribution of the carbon valencies is still unsolved. The Kekulé or Kekulé-Thiele formula is still the one most generally accepted. The problem has been attacked from other points, mainly by the application of physico-chemical methods, and has been contributed to by some of the most prominent of the workers in this field. We may note, for example, the molecular refraction and dispersion work of Brühl, the thermochemistry of Thomson, the general work of Horstmann, and the researches of Hartly, Baly, and Stark on ultra-violet absorption.

Intimately bound up with the constitution of benzene itself is the question of the formation and orientation of the benzene substitution products, or, more generally, the theory of substitution. This field is less restricted and is one which numbers many famous chemists among its explorers. It has provided the aim towards which a vast amount of classical research has been directed, work which has resulted in the enrichment of our knowledge of organic chemistry to a remarkable degree and led to the birth of many fruitful ideas. It has aroused controversy between such eminent experimenters and leaders of chemical thought as Hollemann, Vorländer, Flürscheim, Wieland, Obermiller, and Robinson. Arising out of this question is the theory of steric hindrance, with which the name of Victor Meyer will ever be associated, and it has also led to valuable contributions to our knowledge of tautomerism and stereochemistry.

The benzene ring has been the centre of another controversy which has influenced a large part of our chemical theory—*viz.*, the relation between colour and constitution. This problem has proved to be one of the most difficult and involved in the whole realm of physical science and it is not surprising that it should have attracted some of the most renowned leaders of chemical thought. The experimental and theoretical work of such men as Hantzsch, Kauffmann, Baeyer, Willstätter, and Witt will for ever illumine the annals of both organic and physical chemistry.

Although we are concerned here only with benzene and those products derived directly from it, it must not be forgotten that much of the theory just mentioned has been applied to the numerous other aromatic compounds such as naphthalene, anthracene, and so on. The term "aromatic" is now synonymous with "benzenoid," surely a sufficient tribute to the universal importance of the benzene molecule, and a fact which shows the dominating influence of benzene in organic chemistry in a manner better than any other. We see this influence in nearly every direction, and, in spite of the preponderating share of attention which the "benzene question" has received for generations, it bids fair to provide the ground for still further achievements. Benzene has assisted chemical theory, too, in a somewhat different way. Surely there was never a more timely or fortunate discovery than that of phenylhydrazine by Emil Fischer in 1878. Up to that time the constitution of the sugars had provided one of the most complicated and baffling problems in organic chemistry. In the hands of Fischer phenylhydrazine proved to be the master key, giving him the opportunity of carrying out one of the most brilliant series of researches in the whole of organic chemistry. This provides an instance of how a benzene

derivative has contributed in a practical way to our knowledge of the constitution of organic compounds.

Benzene in Industry

Let us now turn from chemical theory to chemical practice and consider how benzene has played its part in commerce and industry. It is here that we find its application to the needs of the community. It is here that the true significance of Faraday's discovery and of Hofmann's and Mansfield's rediscovery comes home to us, be we chemists or laymen. We may divide the technical and commercial uses of benzene into two sections. In the one it forms the starting material for a large number of chemical compounds the manufacture of which constitutes the dominant part of our organic chemical industry. For these purposes it is used in the pure state. In the other we find the somewhat less pure product which is generally known as benzole and which contains varying proportions of other hydrocarbons, chiefly toluene. This benzole is employed as an end product in itself for a variety of purposes.

For the inception of what is to-day a separate and independent industry—that of coal tar distillation—we are indebted to the work of Hofmann and Mansfield, particularly the latter, who paved the way to the successful recovery of benzene from the tar, thus opening up the source of benzene which was soon to be required in such large quantities to satisfy the needs of chemical industry, more especially the manufacture of dyestuffs. The one derivative of benzene which overshadows the others in importance is aniline. More benzene is used up in the production of aniline than in any other single direction. The first commercial synthetic dyes were made from aniline and such was the importance of aniline in this connection that all artificial dyes came to be known as "aniline dyes," a designation still popular but very wide of the mark.

The dyestuffs industry was founded in this country as was perhaps, natural enough, seeing that we had greater sources of benzene than any other country and that the pioneer work was done here. The industry was allowed to slip into German hands—but that is another story. From aniline are prepared a large number of the most valuable and widely used of all the dyestuffs both for the dyeing of textiles and in the preparation of lake pigments. Every class of dyestuff is represented, the most important being the azo dyes and the triphenylmethane colours. The former provide us with another example of the importance of benzene in organic chemistry. The diazo reaction, discovered by Griess in 1858, is one of the most useful reactions known to the organic chemist and has played a prominent part in synthetic work. The azo dyes, not all, of course, derived from aniline, are the most numerous of all the dyestuffs and are manufactured in greater quantity than those of any other class. Aniline is the starting point for one of the processes for making what is, perhaps, the most famous of all dyes, viz., indigo. Then there are the indulines and nigrosines which are also obtained from benzene *via* aniline. Apart from the production of dyestuffs, which is its main use in industry, aniline is the intermediate for the production of compounds used in medicine, photography and perfumery. Among the medicinal products we have antipyrine, salvarsan, acriflavine and acetanilide, whilst the photographic chemicals include the developers quinol and metol and a number of sensitisers and desensitisers. The production of the former involves the making of quinoline and its derivatives by the Skraup method. This is another famous reaction which provides yet a further instance of the usefulness of benzene in synthetic organic chemistry. The rubber industry benefits to-day by the use of thiocarbanilide and the phenylguanidines as vulcanisation accelerators. During the late war aniline played its part in the production of the explosive, tetryl, and of the "poison gases" diphenylchloroarsine and diphenylcyanoarsine, but we try to rid our memory of these to-day.

Although, as we have mentioned, aniline is the most important benzene derivative, there are a large number of others which are indispensable and which are manufactured in considerable quantities. The first stage in the production of aniline is the conversion of benzene to nitrobenzene. Now nitrobenzene yields another very important dyestuffs intermediate in benzidine which is the basis of many of the direct cotton colours, a large and important class of azo dyes which possess the valuable property of dyeing cotton direct in fast shades without the use of a mordant. Two other benzene derivatives of value to the dyestuffs manufacturer are resorcinol and *m*-phenylenediamine. During the war there was a scarcity of phenol for the production of picric acid. Benzene came to the rescue and provided what was required. The production of synthetic phenol from benzene is still carried on, chiefly in America.

The most familiar of the uses of benzene are, perhaps, those not connected in any way with chemistry. One of the most remarkable developments of modern civilisation is that of mechanical transport. From very modest dimensions only a few years ago, the automobile and aeroplane industries, particularly the former, have grown into one of the largest and most widespread of our industrial activities. Let us remember that the number of motor licences is now a million and that we use up every year several hundred million gallons of motor spirit. A large and increasing proportion of the latter is, as everyone knows, benzole. There has been, and is likely to continue to be, a world shortage of petrol, so that we can prophesy that benzole as a motor fuel has come to stay. This application of benzene is, perhaps, the one most directly useful to man's needs to-day and the one which serves to keep us constantly mindful of what benzene means to us in our everyday life. If we require a further reminder we surely have it when we consider benzene as a solvent. The chemist uses it, so does the dry cleaner and the manufacturers of paints, varnishes, lacquers, detergents, and a host of other everyday commodities. And who among us, when he applied benzene to the grease stain, has not breathed "Out, damned spot!"—audibly or inaudibly according to circumstances?

We may be permitted to muse, to wonder what Faraday's thoughts would be could he come among us to-day and see what a tremendous influence that simple liquid, which he was the first mortal to set eyes upon, has wielded in the development of the last hundred years of our industrial and economic life. We trust that he would be satisfied with his own share. For our part, we are certain he would rejoice in the many brilliant achievements so worthy of his own genius.

Brunner, Mond and Co. and the Häusser Process

To the Editor of THE CHEMICAL AGE.

SIR,—In your footnote to my letter, which you were good enough to publish on the above subject in your issue of June 6, Mr. Roscoe Brunner's statement differs from that which was published both in your valued journal and in the report published in *The Times*. In both cases the words "nitric acid" were not mentioned, and, indeed, it seems quite out of place to mention that product, seeing that synthetic ammonia only was otherwise referred to, and Messrs. Brunner, Mond and Co. do not appear to claim or possess any distinctive process of their own for the manufacture of nitric acid. I would add that a technical contemporary even took upon itself the responsibility of altering the word "Hauser" to "Fauser," so that obviously I was not the only one who was misled by the erroneous references which appeared in the Press.

If the exact terms of Mr. Roscoe Brunner's statement, now communicated to you, are correct, it would seem to be in the general interest that some further explanation in support of them should be offered.—Yours, etc., C. J. GOODWIN.

7 and 8, Idol Lane, Eastcheap, E.C.3.
June 8.

Dyestuff Licences for May

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during May has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee:—The total number of applications received during the month was 595, of which 428 were from merchants or importers. To these should be added 26 cases outstanding on April 30, making a total for the month of 621. These were dealt with as follows:—Granted, 395 (of which 355 were dealt with within 7 days of receipt); referred to British makers of similar products, 141 (of which 106 were dealt with within 7 days of receipt); referred to Reparation Supplies available, 41 (all dealt with within two days of receipt); outstanding on May 30, 1925, 44. Of the total of 621 applications received, 502, or 81 per cent., were dealt with within 7 days of receipt.

The Manufacture of Salvarsan and its Derivatives

By W. W. Myddleton, D.Sc.

The writer discusses the difficulties which were encountered during the early periods of the manufacture of salvarsan in this country after the outbreak of the war. A description is given of the practical details which must be attended to if success is to be assured, while attention is drawn to the necessity for taking special precautions in view of fire risks.

THE production of salvarsan was practically a German monopoly before the war. In 1914 the later and more intricate stages of manufacture were carried out at Ellesmere Port, Cheshire, by Meister Lucius and Brüning, but with the outbreak of war this plant was closed and our supplies were suddenly cut off. In the space of two years, however, the difficulties attending manufacture on a large scale were mastered sufficiently to allow of its production in moderate amount in this country.

The British products were put on the market by Messrs. Evans, Sons, Lescher and Webb, Messrs. Burroughs Wellcome and Co., and Messrs. May and Baker, the latter firm in co-operation with Poulenc Frères, but right through the war period the supply was always inadequate to meet the home demand and that of America.

In the experience of the writer the difficulties encountered were of three distinct types. In the first place it is an extremely difficult matter to obtain the intermediate compound p-hydroxyphenyl-arsinic acid in a crystalline condition and the necessary purity of this substance was attained only after the expenditure of much time and labour. In the second place the methylated ether available during the war contained peroxides and other impurities which had a very harmful effect upon the finished product, which is precipitated in ether. A troublesome purification of ether by redistillation over sodium had therefore to be resorted to. Finally the salvarsan is readily oxidised in contact with air and the products of oxidation are extremely toxic so that it is necessary to carry out the precipitation, filtration, and other operations in the last stages of manufacture in an inert atmosphere. Before we consider the various stages of manufacture in detail we may profitably review the synthesis in outline. In British practice the starting point is either aniline or phenol. The aniline is converted into arsanilic acid (I) by stirring with arsenic acid at a temperature of 170°-200° C. This amphoteric substance, the sodium salt of which is atoxyl, is next diazotised by adding sodium nitrite to a solution acidified with dilute sulphuric acid. The solution is then heated so that the diazo-compound (II) loses nitrogen and is converted into p-hydroxyphenyl-arsinic acid (III). The last-named substance is also obtained directly from phenol by heating with arsenic acid.

Arsenic acid is an active oxidising agent so that considerable amounts of oxidation products are formed when it is heated either with aniline or with phenol. At the same time quantities of poly-arsinic acids are produced. The hydroxy acid (III) is dissolved in concentrated sulphuric acid and nitrated by adding a mixture of sulphuric and nitric acids. The mono-nitro derivative 3-nitro-4-hydroxyphenyl arsinic acid (IV) crystallises out when the mixture is poured into ice-cold water.

The nitro compound is next dissolved in dilute caustic soda solution and is reduced by adding sodium hydrosulphite. The reduction product 3 : 3^1-diamino-4 : 4^1-dihydroxyarsenobenzene (V) separates out as a yellow powder which is soluble in alkalis and in acids. This is the base of which salvarsan (VI) is the di-hydrochloride.

The base is converted into the hydrochloride by dissolving in closed vessels filled with hydrogen or carbon dioxide in a solution of hydrochloric acid gas in methyl alcohol. After filtration in closed filters the solution is run into methylated ether and the hydrochloride is immediately thrown down as a bright yellow, finely crystalline powder.

Preparation of p-Hydroxyphenyl-Arsinic Acid

The reaction vessel is a 10 gallon enamel-lined, oil-jacketed pan with a tight bolted lid with large manhole. There is a stirrer shaft and a two-inch outlet pipe passing straight upwards and opening through the roof so that the first rush of arsenical fumes may be carried from the building. A thermometer tube is an advantage. A run-off pipe at the lower end of the pan serves no useful purpose, because it is rapidly choked up.

Into the pan are charged—

25 lb. phenol (carbolic acid) crystals,

40 lb. arsenic acid ($H_3AsO_4.\frac{1}{2}H_2O$).

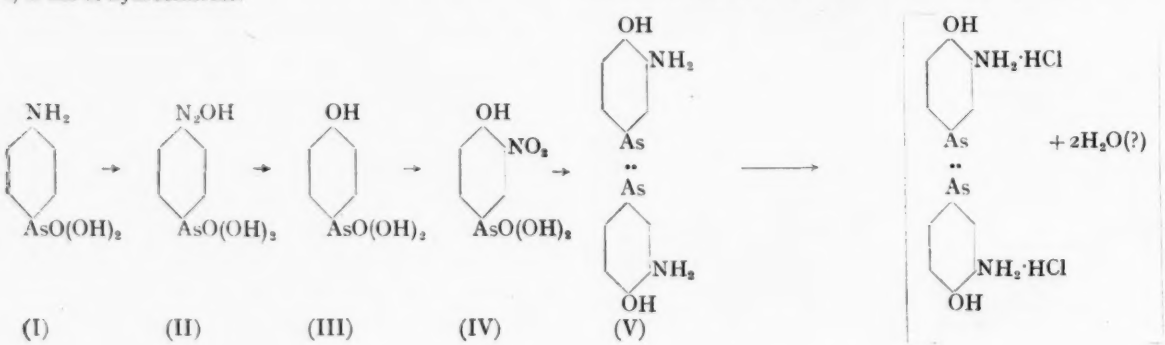
The arsenic acid should not be previously dried by strongly heating but should be powdered by grinding in a suitable mill—a ball mill gives satisfactory results. Care must be taken to prevent extensive absorption of moisture by the hygroscopic substance during grinding.

The stirrer is now started and the pan is heated by direct flame—a large primus lamp was found satisfactory. The temperature is allowed to rise to 150° C. at which point a vigorous reaction sets in and the heating must at once be discontinued. Unless the joints of the lid are carefully packed an escape of arsenical fumes will take place at the beginning of the reaction. After the vigour of the reaction has abated the heating is resumed and the temperature of the pan is maintained at 150° C. for six hours.

The contents of the pan are then allowed to cool while the stirring is kept up. When the temperature has fallen to 80° C. the pan is filled almost to the top with water heated to the same temperature and the mass is stirred for half an hour. The liquor is easily siphoned off into a large steam jacketed open pan. The extraction is repeated until the bulk of the liquor is from 15 to 20 gallons. The liquor is run through a filter press and charged into a steam jacketed vacuum pan where it is evaporated to the consistency of a thick treacle.

The insoluble matter in the reaction pan is transferred to the open pan and is crushed in about 10 gallons of water heated to 80° C. The liquor is used to extract the next charge in the reaction pan.

The contents of the vacuum pan are run into shallow enamel trays and are further dehydrated in a vacuum oven. The product solidifies on cooling to a reddish brown mass. The crude product is broken up and crushed with 7 gallons cold acetone. This forms the main extract which is filtered through a small filter press. The residue is further extracted with three 2-gallon lots of acetone and the washings are used for the first extraction of the next batch. The main extract is evaporated in a small still, and the residue, a syrupy oil, is allowed to stand for several days to crystallise. A final drying in the vacuum



(I) (II) (III) (IV) (V)

oven hastens the crystallisation. Seeding is generally required and the partially solidified mass is centrifuged. The yield before centrifuging is approximately 45 lb. and the solid after centrifuging weighs on an average 16 lb. The product thus obtained is sufficiently pure for further use but may be purified by recrystallisation from glacial acetic acid. The melting point is between 170° C. and 173° C. with decomposition as compared with 178° C. after recrystallisation.

The p-hydroxyphenyl-arsinic acid may be recovered in the form of the sodium salt either (1) before or (2) after the acetone extraction, and this can be used for the next stage without conversion into the free acid. It must be remembered that acetone is highly inflammable, so that extraction should be carried out some distance away from the fire heated pans.

Preparation of 3-Nitro-4-Hydroxyphenyl-Arsinic Acid

The nitrating vessel is a 10 gallon thickly enamelled or preferably a resistant iron pan, jacketed for the circulation of cooled brine from a refrigerator and fitted with a stirrer and run-off pipe. Eighteen litres concentrated sulphuric acid are cooled in the pan to 0° C. and 5·24 kilogrammes of p-hydroxyphenyl-arsinic acid or 5·76 kilos. of the dried sodium salt are slowly stirred in, the temperature being kept at 0° C. The nitrating mixture is made by mixing 1·46 litres nitric acid (S.G. 1·42) with an equal volume of concentrated sulphuric acid. This mixture is slowly run into the pan, the temperature never being allowed to rise above 0° C.

The solution is stirred for half an hour after the addition of the whole of the nitrating solution and the temperature is then allowed to rise to 10° C., where it is maintained for one hour.

The clear solution is slowly poured into 20 gallons of ice water in a refrigerated open pan. The pan is cooled at intervals for two days at the end of which the nitro compound is found to have crystallised in large lemon-yellow prisms. The yield is 79 per cent. of the theoretical and is very slightly improved by salting out from the acid liquor.

Reduction of the Nitro Compound

Reduction is effected in two 25 gallon enamelled vessels fitted with stirring gear and bolted lids and provided with run-off cocks at the bottom. These vessels are placed in large wooden tubs which may be filled with water heated by open steam pipes. Each reaction pan is connected with the vacuum line and as the pans are used alternately the empty one may be used to collect the filtration liquor from the other.

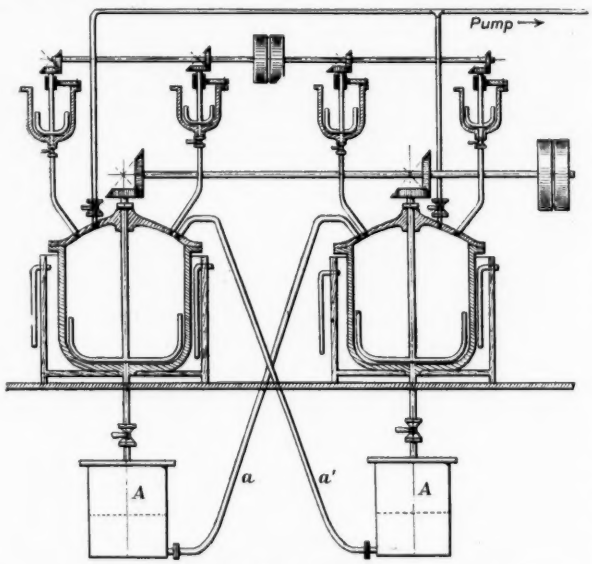


FIG. 1 *E. J. Blewett*

MANHOLES AND THERMOMETER TUBES OMITTED

The outlet pipes discharge into a cylindrical porcelain or enamelled filter shown at *A* in Fig. 1. Filter papers or cloths placed on the filter retain the reduced product while the liquor is carried by the pipe (*a*) or (a^1) to the second pan.

(1). Myddleton. Brit. Pat. 119964. 1918.
(2). Kay. Brit. Pat. 6322. 1915.

Above each large reduction pan are placed two smaller pans, also fitted with stirring gear but without lids. There is a run-off pipe leading from the bottom of each of these into the large vessel. One of the pans has a capacity of about 1 gallon and the other about 2 gallons. Into the gallon pan are placed 2·56 kilogrammes crystalline magnesium chloride and sufficient water to dissolve it. Into the 2-gallon pan are placed 1 gallon water, 0·75 litres of a ten times normal solution of caustic soda (400 grm. per litre), followed by 0·985 kilos. of the nitro compound. The substances in the two small pans are then brought into solution by stirring. Sixteen gallons of water are run into the large reduction pan and 12·42 kilos. sodium hydrosulphite of 95 per cent. strength are dissolved in them. The magnesium chloride solution and the solution of the nitro compound are discharged into the reduction vessel while the stirrer is slowly mixing the solutions. This operation should be completed in about ¼ hour.

The water in the wooden tank surrounding the large pan is heated so that the contents of the pan are warmed to 55°–60° C. Stirring is maintained for about four hours while the taps from the small pans are kept open. The salvarsan base slowly precipitates from the solution, and the end of the reaction can be judged by withdrawing a little of the solution from below and heating to the temperature of boiling water. If no further precipitate is formed the reaction is over. The pan is cooled as quickly as possible by circulating cold water through the water tank, and the precipitated base is filtered off through the funnel, which is fitted with a loose wooden lid to prevent excessive exposure of the precipitate and solution to air. As explained earlier, filtration is effected by closing the second reduction vessel and reducing the pressure at the pump. The precipitate is kept covered with liquor as far as possible, and is finally washed with water containing a little sulphur dioxide to minimise oxidation of the base. It is a distinct advantage to drain the precipitate well and then finish drying in a cold vacuum oven in which a trough of concentrated sulphuric acid is placed.

A second batch of nitro compound is produced in the liquor filtered from the first batch, and a smaller amount of magnesium chloride and of hydrosulphite are then required. The two batches of salvarsan base are thoroughly dried in vacuo, and they form a single charge for the final process. The vacuum oven should be connected with a supply of hydrogen, preferably a cylinder, so that residual air may be swept out by alternately evacuating and admitting hydrogen.

Although it will be noticed that the salvarsan itself is formed with two molecules of water of crystallisation according to the accepted formula, it is not advisable to leave the base wet, since an excess of water in the next stage leads to precipitation of the hydrochloride in a sticky condition so that it adheres to the walls of the vessels and is difficult to filter. The drying of the base also leads to greater stability in the final product, and although slightly less water of crystallisation is present a salvarsan of uniformly lower toxicity is obtained. The salvarsan base obtained in the manner described contains many impurities, as, for example, metallic salts, sulphurised compounds of arsenic, as well as oxidation products. Conversion of the base into the hydrochloride serves to eliminate most of these impurities and at the same time to render the product soluble in water.

Formation of the Hydrochloride

A diagram of the plant used for the final process in salvarsan manufacture is shown in Fig. 2. The 2-gallon enamel pan *A* is fitted with stirring gear, a vacuum pipe (*a*), a pipe (*b*) for leading in carbon dioxide, and a run-off pipe (*c*) made of silver. The manhole, which should be as large as possible and furnished with an observation glass, is loosened, and the vessel filled with carbon dioxide from the cylinder *B*. The double batch of dried salvarsan base is introduced through the manhole and 8 litres of a solution of 300 grm. hydrochloric acid gas in methyl alcohol (free from acetone) is added, together with 110 ccs. water (distilled). The vessel is closed down and evacuated. Residual air is swept out by filling with carbon dioxide, evacuating again, and repeating the cycle several times. The stirrer is started with almost one atmosphere of carbon dioxide in the pan, and the base is brought into solution as the hydrochloride. A wooden tank serving as a water jacket allows of the pan being warmed to about 35° C. to facilitate solution.

The solution is filtered through an airtight filter *C*, and passes into the glass bottle *D*. The filter is formed by inverting a porcelain Buchner funnel from which the perforated plate has been removed over a similar funnel with perforated plate intact, and securing them together with a tight rubber band

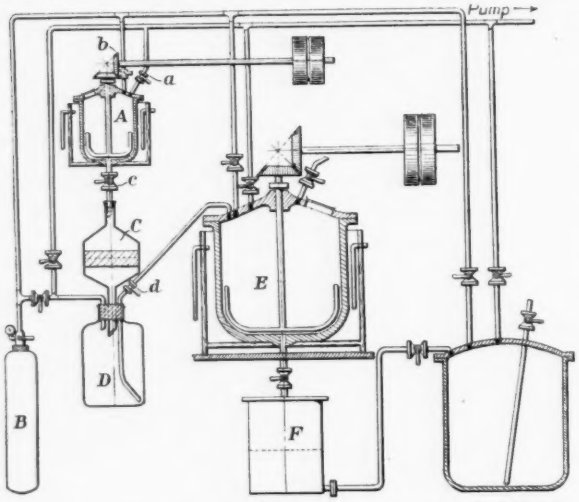


FIG. 2 *E. J. Blewett*

such as a section cut from a motor tyre inner tube. Before joining the funnels together a double filter paper is secured round the rim to the lower funnel by means of an adhesive, such as Seccotine. The lower funnel opens into the glass bottle, which can be evacuated or filled with carbon dioxide. The bottle and filter are repeatedly evacuated and filled with the gas, and finally with a slightly diminished pressure in them and a pressure of carbon dioxide in the pan *A*, the cock (*c*) is opened slowly and the solution filtered.

The clear solution can be emptied through the silver pipe (*d*) into the precipitating pan *E*. The enamelled pan *E* has a capacity of 25 gallons, and is fitted with stirring gear and connections to vacuum and carbon dioxide. It has also an inlet pipe from an ether storage tank and an outlet pipe leading to a closed filter *F*. It is an advantage to have the pan surrounded by a water tank so that it may be chilled to −5 C.

The pan is charged with 18 gallons of dried ether and is freed from air in the usual manner. The ether is chilled, and with pressure in the glass bottle *D* and slightly diminished pressure in *E* the filtered alcoholic solution is slowly run in with stirring. The salvarsan is precipitated as a pale yellow, finely crystalline powder. It is allowed to stand at a low temperature for two hours, and it is then filtered through the closed filter. The filter *F* is lined with porcelain throughout. It has a bolted lid and the run-off passes to a large tank which is fitted with vacuum and carbon dioxide pipes. The filter is freed from air, and the precipitate in *E* is collected on paper or cloths after the stirrer in *E* has been set in motion.

When the precipitating pan has been emptied the contents of the filter are washed with fresh ether admitted through *E*.

The salvarsan is dried while in the filter by shutting off the ether tank and evacuating and filling with gas the filter and the pan *E*. The upper portion of the filter containing the product is taken out and placed in a cold vacuum oven containing fresh shavings of paraffin wax and a trough of sulphuric acid, and the oven is then repeatedly evacuated and filled with gas, and finally left under vacuum for several hours.

The dried salvarsan has a tendency to cake during the drying, and it is necessary to grind in a large mortar under a rubber shade in a current of carbon dioxide. The powder which is moderately stable in air if prepared under the conditions described, is filled into ampules of 300–500 cc. capacity previously filled with carbon dioxide and repeatedly evacuated and filled with gas before sealing off in the blowpipe.

Weighing Out Into Doses

The containers for the measured doses are small glass ampules of 5–6 cc. capacity, with rounded ends. About ten small glass funnels with stems the same diameter as the necks of the ampules are cut down so that the stems are about 1 cm. long. The funnels are attached by short pieces of thin rubber tubing to ten of the ampules, so that the glass edges are almost in contact.

Ten glass right-angled bends drawn out at one end are joined by rubber tubing at the other end to ten glass tubes sealed into a long glass stem. The stem is attached to a supply of carbon dioxide (from Kipp dried through sulphuric acid wash bottle), and a stream of the gas passes through each of the right-angled bends. The drawn-out ends are passed through the funnels into the ten ampules, so that these are filled with the gas. Doses of salvarsan weighing from 0·1 grm. to 1·0 grm. are weighed out rapidly on a balance in the usual glass case into a light glass scoop, and as the dose is weighed it is brushed into one of the funnels and induced to enter the ampule by movement of the right-angled bend. A slow stream of gas is maintained through the ampules until ten doses have been measured out. If there is any interruption in the weighing out process it is necessary to introduce a right-angled bend passing carbon dioxide into the stock bottles during the interval. The ampules are then slipped out of the rubber tubes and are joined up to a second battery of T joints, which can be evacuated or filled with carbon dioxide. The connection is made with rubber pressure tubing.

The ampules are cautiously evacuated, care being taken to avoid sucking the powder violently into the tubes. They are then filled with gas, and the cycle is repeated several times to make certain that air has been removed completely. The necks of the ampules are then sealed off at the blowpipe.

Testing the Product

The toxicity of the salvarsan must be examined in each batch prepared and official tests are insisted upon before a batch is issued for use.

The safety of the product is demonstrated by injecting a dilute alkaline solution of the substance in amounts bordering upon the maximum tolerated dose into prominent veins in the ears of rabbits. The dose is calculated upon the body weight of the rabbit.

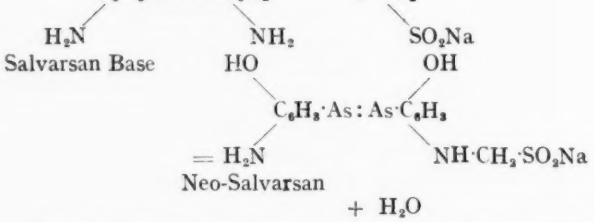
In the case of salvarsan and neo-salvarsan the relation between the dose capable of complete therapeutic action and the maximal non-toxic dose is 1 : 58, so that these substances are to be considered "good therapeutic measures."

No reliable chemical tests have yet been devised.

Preparation of Neo-Salvarsan

In the writer's experience the best method of preparation of neo-salvarsan is from the salvarsan. The plant used in the formation of salvarsan from its base can be employed. 400 grms. of the salvarsan are placed in the pan *A*, Fig. 2, which has previously been filled with carbon dioxide. The salvarsan is dissolved in a mixture of 3·2 litres ethylene glycol (glycerine may be used, but is more troublesome) and 400 ccs. of water. The pan is warmed up to 30°–40° C., and the contents stirred to effect complete solution.

640 ccs. of a solution containing 125 grms. anhydrous sodium carbonate per litre are then slowly added to precipitate salvarsan base in a fine semi-colloidal condition. 240 grms. sodium sulphoxylate (formaldehyde sulphoxylate or formasul) dissolved in 480 ccs. water are then added, and the pan is evacuated and filled with carbon dioxide several times over to wash out residual air. The pan is warmed to 35° C. for from 1 to 1½ hours, by which time a clear bright yellow solution has been produced.



The solution is filtered and precipitated in the pan *E* in 10 gallons ethyl alcohol, cooled to a temperature of about −5° C. The fine powder is filtered after standing for two hours,

and is washed with alcohol and dried in the cold vacuum oven in a rarified atmosphere of hydrogen.

An efficient rectifying column is a necessary adjunct to the plant, whether salvarsan is made solely or whether it is converted into neo-salvarsan. Large volumes of ether-methyl alcohol and glycol-ethyl alcohol require careful fractionation before they can be utilised again.

It will be noted also that the organic solvents used in the various stages of manufacture are highly inflammable, and special fire risks must be considered carefully, and methods of illumination specially designed. It is obvious that the plant described may prove useful in the preparation of other substances susceptible to rapid oxidation in contact with air.

Chemical Exhibits at the British Empire Exhibition

Further notes are published below on the chemical exhibits at Wembley. The remainder of the exhibits will be noticed in future issues.

Grieve and Gordon

Grieve and Gordon, of Australia and London, have an interesting exhibit in that it includes working plant. The firm are manufacturers of pure eucalyptus oil and many compounds and specific mixtures built upon the oil.

The stand shows a small plant for the extraction of the oil from the dried leaves with which the stand and surrounds are decorated.

The thin leaves, closely resembling our willow, clearly show the oil-containing cells when held up to the light. They are filled into a metal container, sealed and steamed for about 12 minutes, when the oil, as vapour, passes through a coil to a simple condensing apparatus to complete the distillation. The crude oil is then further refined by a similar process. The resultant oil is water-white and floats in a thick layer upon a water tank. It is certified 75 per cent. cineol but normally the percentage is as high as 85 or even over.

A multitude of medicinal virtues is claimed for the oil in its pure state and with added ingredients. It is stated to be four times as strong as carbolic as an insecticide and germicide, and prepared as a base for a disinfectant mixture, in a solution of 1 part to 150 water, it is stated to be non-poisonous and non-staining. The exhibitors offer practical proof of these qualities by spraying their own clothes freely and by drinking the solution. In another form the oil is alleged to be a more efficient solvent than benzene. The firm reports extensive adoption of the oil by cleaners as it leaves no stain or residue.

The special sealing mixture exploited by the firm is worthy of note. Known as "Capsito" it is a vegetable product containing no rubber, although affording all the advantages that rubber mixtures give. It will not crack or allow a leak, it is non-poisonous and will take any colour. It is unaffected by spirits or acids, but boiling water impairs its efficiency. It has passed tests of prolonged storage and transport, and is equally efficient in the tropics as in the intense cold. Several important preserve manufacturers and bottlers in this country are said to have adopted "Capsito," since Grieve and Gordon's display at Wembley last year.

Newton, Chambers and Co., Ltd.

Newton, Chambers and Co. have a well planned stand fronting on the main gangway of the Chemical Section. The exhibit is arranged to impress upon the public by convincing tests and easily understandable experiments, the manifold forms and applications of their Izal products. The plan has succeeded in attracting the public, and there is quite keen competition to pass along the range of microscopes displaying the germs of well known diseases which can be combated by the use of Izal. The products are shown in a wide range, from dry germicides and poultry powders to Izal sawdust and peatdust. On the toilet side there are excellent displays of soaps, lozenges, pastes, ointments, creams, all embodying the essential qualities of Izal, which, incidentally, has been adopted as an official disinfectant for the British Empire Exhibition. The disinfectant mixture is miscible in any hard water—a great advantage over many forms of disinfectant which float on certain waters.

The numerous disinfectants are backed up by a representative showing of apparatus for purposes of application. Although no new forms are exhibited, the efficiency of the special sprayers, vaporisers, powder blowers, is well demonstrated and the concentrated Izal germicide is packed in tin flasks with handy sprinkler stopper. A point appreciated by the public is that one pint of Izal will make 75 gallons of guaranteed disinfectant. The stand is well stocked with pamphlets, and deserves the attention it is certainly receiving.

T. Lye and Sons

The main works of this old established firm specialise in the bleaching and dyeing of that wide range of materials that go to produce the ubiquitous "hat"; straw, hemp, foreign leaves and grasses, artificial silks and textiles all contribute their share. The successful treatment of fabrics woven with, perhaps, mixtures of robust exotic grasses and the most delicate of textile fibres presents many technical problems. For this purpose chemicals of high purity are required and the subsidiary works of Lye and Sons have been developed for their manufacture. Hydrogen peroxide (technical and medicinal), sulphites of soda, bisulphites of soda (liquid and anhydrous), blanc fixe and pyrophosphates of soda are all produced upon a large scale, and are well known to the chemical trade under the firm's trade mark "Cross Keys" brand. Examples of the products of both works are shown and form a unique and interesting exhibit.

Naylor Brothers (London), Ltd.

These well-known varnish and paint manufacturers show a testimonial received from the authorities of the Great Exhibition of 1851 testifying to the satisfaction their varnish stain had given when used on the exhibition buildings in that year. This varnish stain is that now offered to the public under the trade name "Fastain," for use on floors, furniture, and all sorts of woodwork.

The Naylor stand is finished partly in their imitation stone paint "Petrumite," an oil paint which can be applied to walls, brickwork, wood, etc., and gives a realistic imitation of stone. It is made in various stone shades. It becomes tremendously hard and will withstand weather, scrubbing and washing, etc., and, left uncleaned, it weathers just like natural stone.

W. J. Bush and Co., Ltd.

This firm has several show cases devoted to synthetic products. Chemicals for the essence-making, perfumery, and lacquering trades are represented by benzyl valeriarate, amyl formate, benzyl and amyl acetate, benzyl butyrate, etc. For soap manufacturers there is a good show of products, including hydroxy citronellal, coumarin, thymol, vanillin, terpineol acetophenone, and methyl acetophenone; while solvent acetic ether, butyl acetate, benzyl alcohol, and tricresyl phosphate represented the requirements of the varnish and lacquering industries. An extensive range of colouring products for the confectionery, liquor, and mineral water industries included golden caramel, orange amber, primrose, crême de menthe and other fruit shades. There is also a good showing of materials for the manufacture of essential oils.

Spencer Chapman and Messel, Ltd.

The exhibit of this firm consists of well-displayed show-cases. These are devoted to sulphuric acids of varying grades, and to oleum, saltcake, etc. Excellent samples of SO_3, oleum 40 per cent. and 80 per cent., and sulphuric acid 96 per cent. are shown, and a noteworthy feature of the stand is an inquiry box prominently placed and suitably inscribed. It is a step all firms with unattended exhibits might take.

Dunnips

This stand has exhibits of attache creme and other preparations for the hair, face, teeth, nails, etc.

Gas Engineers' Annual Meeting

Award to Dr. Charles Carpenter

THE annual meeting of the Institution of Gas Engineers was opened at the Institute of Civil Engineers, Westminster, on Tuesday, Mr. J. Ferguson Bell, president, occupying the chair.

Sir ALFRED MOND said the cause of depression in industry was the difference between the cost of production and the money available for the purchase of their goods. The question was could they bridge that gap? Could they not marry the expenditure on unemployment to the costs of production in such a way as to permit them to produce goods at a price which the consumer could pay? He thought they could.

The President asked Dr. Charles Carpenter to accept the Birmingham Medal, and the H. E. Jones London Medal was presented to Mr. R. E. Gibson for a paper read in 1924. Diplomas in Gas Engineering were presented to the following: First class—H. T. Prater (London), for a thesis on "Coal Gas Condensation." Second Class—S. Smith (Birkenhead), "Manufacture of Sulphate of Ammonia." T. V. Blake (Cardiff), "Volatile Products of Coal with Continuous Vertical Retorts." D. D. Melvin (Glasgow), "The St. Murgo Washer-Scrubber." T. Dyson (Huddersfield), "Construction and Working of the Dempster-Toogood System of Vertical Retorts." C. Bateman (Cardiff), "Neutralisation of Sulphate of Ammonia."

A donation of £100 to the Lord Moulton Memorial Fund was agreed.

In his presidential address, Mr. BELL spoke of the steady and continuous growth of the industry. In the last five years the total output of gas had increased from 242,000,000,000 cu. ft. to 282,000,000,000 cu. ft., and the number of consumers had increased from 8,000,000 to over 8,500,000. The capital employed had increased from £156,869,911 in 1920 to £173,470,766 in 1923. In view of suggested Government subsidies for electricity, it was as well that it should be known that with electricity at the low price of 1d. per unit and gas at 8d. per therm, heating operations carried out by electricity cost three or four times as much as when performed by gas. In regard to power, they were supplying gas for engines in Derby at a price that made the figure for power about a halfpenny per brake horse power per hour. At that figure there was no necessity for the Government to subsidise power or electricity companies to enable manufacturers to obtain cheap power. He entered an emphatic protest against any such one-sided scheme as the Government proposals in relation to electricity.

Mr. D. Milne Watson, of the Gas Light and Coke Co., led a deputation, representing company and municipal gas undertakings, to the Minister of Transport. They asked for the earliest possible intimation of any proposed Government measures that would in any way affect the gas or electrical industries. The petitions were promised full consideration.

Bitumen *v.* Tar

A luncheon was held at the Royal Automobile Club on Wednesday, the principal guests being the President of the Board of Trade (Sir Philip Cunliffe-Lister), and the Right Hon. J. H. Thomas, M.P. The question of bitumen *v.* tar, the latter a by-product of gasmaking, was discussed.

Mr. J. H. THOMAS, proposing the toast, "The Institution of Gas Engineers," urged the importance of placing in the forefront of their conference deliberations the situation of their raw material—coal.

Mr. D. MILNE WATSON, governor of the Gas Light and Coke Company, proposing the toast of "Trade and Industry," deplored the suggestion that bitumen should be used on the great arterial roads instead of tar, the home product.

The PRESIDENT OF THE BOARD OF TRADE, responding, said the representatives present were the high priests of a great and successful industry, a very good example of one which had worked out its own success, founded on skilful management, constant scientific research in production and by-products, a model in its relations with labour, and something in the way of a model in public service. They had a perfect right to demand fair-play, but in doing so he hoped they would not spoil their case by placing it too high by declaring that all other methods were unsound. Such action prejudiced their claim. It was of vital importance when the use of an outside product was used to consider whether a home industry could be employed instead of a foreign one. In the employment of any product of coal a home industry was helped, and more money was provided to find new markets. He would like to know whether the roads in Kent, which had led to many great discussions and developments, had secured success by way of bitumen or tar.

Dr. Carpenter interpolated that tar was employed.

The report of the Benevolent Fund of the Institution, presented by Mr. Dunn, its secretary, showed that the income during 1924–5, was £534 10s. Grants to widows, orphans, and aged members absorbed £489 18s., and there was a credit balance of £5 16s. 11d.

Mr. J. FERGUSON BELL announced that the Lord Mayor of Manchester had given a donation of £100 to the fund, which was to be invested in War Bonds.

On Thursday two papers were read—"Town's Gas for Motive Power" by Sir Dugald Clerk, F.R.S., and "The Economics of Gas Production on the Thermal Basis" by Mr. George Evetts. In the afternoon visits to the National Physical Laboratory, the Fulham works of the Gas Light and Coke Co., and the laboratories of the South Metropolitan Gas Co. were made. On Friday a visit to Derby with local trips was carried out.

A New Green Pigment for Tennis Courts

Interesting Chemical Success

TESTS carried out by the British Portland Cement Association on a new kind of coloured concrete seem to show that a permanent green for hard tennis courts has at last been discovered as the result of chemical research and experiment. The preliminary trials have proved satisfactory, and, if subsequent tests under playing conditions justify the claim regarding permanence of colour, a long-standing problem will have been solved.

The pigment, produced by a secret process belonging to a London firm, is understood to consist of barytes stained with an organic dye. This is said to be extremely resistant to alkaline reaction and also to cost about a quarter of the price of chromium oxide. Hitherto fair results have been obtained by staining the concrete for green hard courts with a solution of chrome alum, etc., but the "staying powers" and resistance to wear of such stains are rather doubtful. This resistance to wear depends upon the effective depth of the stain, which in its turn depends upon the permeability of the concrete. Some of the copper salts, particularly copper sulphate, give an intense blue-green stain which seems capable of penetrating beyond the outer "skin" of the concrete. This, however, is useless in a tennis court, owing to the poisonous nature of the copper, which would be a grave danger to any player who happened to slip and cut himself. The method of mixing cement with suitable crushed green stone would give an almost ideal concrete for the purpose were it not for the absence of such stone in any considerable quantity. Sands of a green colour are sometimes found, but, unfortunately, these, when exposed to the air, turn brown or red owing to oxidation of the iron present.

Exhibition of Inventions

THE exhibition of inventions organised by the Institute of Patentees (Inc.), at Central Hall, Westminster, this week contains a few articles of interest to the chemical industry, but mainly the inventions are domestic.

There is a filling machine which, while embodying all the usual principles of this type of plant, claims to be greatly simplified and can be worked by a child. It is practically dust-proof and dustless in use. For filling small quantities a portable model is made. An innocent-looking bottle purports to contain an "improved composition" for photographic plates, films, etc., and it is said to do an hour's work in a minute, but there was none to offer enlightenment. New advertising ideas and devices are prominent, and there are one or two exhibits on the mechanical side and domestic disinfecting apparatus.

A new works truck, showing for the first time in London, but already used by chemical firms, is the Willmot One-Man Truck. It is a British all-steel production, and considerable labour saving is claimed for it. The wheels are rubber tyred, fitted with adjustable ball bearings, and the whole frame is mounted on stout springs. Fatigue is claimed to be halved, noise is eliminated, and floor wear reduced to a minimum. A heavy load can be lifted, moved and unloaded by one man. The body is of steel tubing, strongly welded, and thus combines efficiency with small weight.

Proposed Gas Mantle Protection

Foreign Manufacturers' Evidence

THE inquiry into the application of the Incandescent Mantle Manufacturers' Association for a duty on imported gas mantles was resumed at the offices of the Board of Trade on Thursday, June 4. This was the third sitting of the Committee, and the previous proceedings were reported in THE CHEMICAL AGE of May 23 and 30.

Mr. MACASKIE (who appeared for the importers) first cross-examined at length Mr. G. P. H. Soper, who is the principal witness for the applicants.

Mr. MACASKIE pointed out that witness had said that a duty was necessary because the industry in this country was being destroyed by unfair competition, and he asked how it was able to exist before the war, when competition from Germany was keen.

An Attempted Agreement with Germany

Mr. SOPER said that it then existed in this country partly as a German industry. There were German companies producing mantles here. In reply to the Chairman, he said there was no agreement between British and German manufacturers. In February, 1914, British manufacturers met to discuss certain proposals put forward by the German mantle manufacturers and thorium producers. The proposals were aimed at stopping the competition in prices, which were not remunerative either to the British or to the German manufacturers. A meeting of manufacturers was subsequently held in Berlin. The British manufacturers did not come to an agreement, and he believed the meeting in Berlin had broken up in confusion.

Reference was then made to the existing key industries duty on imported German thorium. Witness said that this did not help the British mantle industry, but had the reverse effect, because if the British manufacturers of mantles wanted to import thorium from Germany, they had to pay the duty of 33⅓ per cent. on it. It was pointed out by Mr. Macaskie that the duty had to be paid on the thorium content of German mantles, and this amounted to about 9d. per gross of mantles, or 5s. 3d. per thousand, which was slightly more than the British manufacturer would have to pay in duty if he imported the pure thorium.

Raw Materials

With regard to the evidence given, to the effect that the British mantle manufacturers paid more for their raw materials, which were manufactured in this country, than did foreign manufacturers, because wages in this country were higher, Mr. Macaskie said that the average importation of ramie yarn during the last four years was 177,000 lb. per annum, as shown by the Customs returns. Taking 1 lb. of ramie yarn as the approximate amount used in a gross of mantles, it meant that 177,000 gross were made per annum from imported ramie yarn, which represented 59 per cent. of the total British output of mantles. Again, 75,000 lb. of thorium nitrate per annum was imported during that period, sufficient to make 90 per cent. of the total output of mantles.

Mr. SOPER replied that the key industries duty on imported thorium increased the price to the level of the English price, and that the prices of British and foreign ramie yarn were about the same. Also, ramie yarn was used for purposes other than gas mantles, so that it was not necessarily imported only for that purpose.

Mr. GEORGE C. SHARP, of Glasgow (agent for the Export Gasglühlicht Gesellschaft, of Berlin), in evidence, said he sold mantles for the German firm to wholesalers and retailers in this country. He handed in a confidential statement showing the number and prices of mantles which he had sold since 1922. The average import prices of German mantles in 1924 and 1925 which had been given by the applicants, and taken from the Customs returns, he did not regard as accurately representing the prices at which the mantles were sold or offered for sale in this country. They were misleading because they were average prices, and did not state what mantles were referred to.

Mr. H. TALBOT (general manager, Welsbach Light Co., Ltd.) was recalled for cross-examination. He handed in the balance sheets of the Welsbach Co. for the last five years. The Chairman said the dividends had been reduced from 15 to 5 per cent., and a dividend was still being paid on the ordinary shares, chiefly out of reserves. Questioned as to the prices at which German mantles were sold in this country, Mr. Talbot produced copies of reports from travellers of the Welsbach Co. relating to customers who had bought German mantles, and stating the prices at which they were bought. These prices ranged from 18s. to 28s. per gross.

Mr. LOUIS SCAL (director of Littleton, Rose and Co., Ltd., general traders, of London) gave evidence for the opponents, and said that before the war he was the sole selling agent in this country of the Auerlicht Co., of Austria. That company did not import at present, because they could not make it pay.

German Director's Statement

HERR HEINRICH ZIEGLER (managing director, Deutsche Gasglühlicht Gesellschaft, Berlin), in evidence, said that his company produced 50 per cent. of the gas mantles now manufactured in Germany, and before the war they controlled the Welsbach Co. The deposits of monasite sand at Travancore, which it was said were in German hands, had been lost to the Germans. Thorium was sold in Germany at present at 10s. per kilo, and the key industries duty when imported to this country amounted to 33⅓ per cent. of that; on a gross of mantles it represented about 9d. He agreed that the price of ramie yarn was about the same in Germany as in this country. With regard to wages, he gave details of the increases which had been made since 1923, and said that the hourly rate paid to girls over 19 years of age, including the employers' contribution towards insurance premiums, etc., amounted to the equivalent of 6d. per hour, which compared with 6½d. per hour paid in this country. He had not seen the Welsbach and Falk-Stadelmann works at Wandsworth and Earlsfield since the war, but if they were at present equipped as well as they were before the war, he should say that his own company's works were as good as those. His works in Germany were equipped with modern installations. Labour represented about 30 per cent. of the cost of production of the mantle. The wholesale price in Germany of similar mantles to those sold here at 24s.6d. per gross was 21s. 6d. per gross. The carriage, freight, and insurance charges between the German factory and the English port of discharge were about 3s. per gross. In regard to the duty on mantles imported into Germany, he was indifferent as to whether or not that was taken off. He was giving evidence in the present instance because his company was responsible for more than 50 per cent. of the mantles imported into this country. Witness agreed that if this country and Germany entered into an agreement not to impose an import duty into either country, he would be prepared to beat the Britisher on his own ground.

Replying to Sir John Barran (a member of the Committee) witness said there was nothing in the nature of State control in Germany, and there was no restriction on export.

The Committee resumed its hearing on Tuesday.

HERR HEINRICH ZIEGLER handed in copies of wages agreements which had been entered into by his company recently (in order to justify the figures he had given at the last sitting), as well as a statement as to the taxes payable in Germany. With regard to prices in this country, witness agreed that during 1923 (when there was a duty on German mantles under Part II of the Safeguarding of Industries Act, 1921), his prices here were less than the prices operating at the present time. He admitted that those prices were based upon the prices ruling in this country, and not upon his production costs, the reason being that, owing to the inflation of German currency, he did not know what his production costs were. At present, however, prices were based on production costs, which he could ascertain because the German currency was stabilised. The stabilisation took place about November, 1923, and although the low prices charged yielded his company a profit before that time, they did not yield a profit after stabilisation. Asked what was the present price of standard German mantles in the United States, witness said he did not now export to that country, because the duty was too high.

This concluded the evidence on behalf of the importers who are opposing the application.

Mr. N. W. BUIS said that he had been to Germany within the last fortnight, and had ascertained from a worker at the Auer company's factory at Berlin, the rates of wages paid. These were considerably below the figures given by Herr Ziegler. He had also advertised for clerical workers, and salaries asked for by applicants were also low.

Mr. C. S. GARLAND (managing director of the Clay Ring Co., Ltd.) said that the price of mantle rings was not fixed by the mantle manufacturers; he fixed the price in relation to the cost of production.

Thorium Nitrate Manufacturer's Evidence

Mr. EDMUND WHITE (managing director of Hopkin and Williams (Travancore), Ltd., and of Thorium, Ltd.) referred to the German control of the deposits of monazite sand (from which thorium nitrate was made) before the war, and said that when war broke out, thorium nitrate was not being commercially manufactured from monazite in this country. As soon as supplies were available, however, Thorium, Ltd., commenced to produce thorium nitrate and cerium. The manufacture of thorium in this country could not be safeguarded if gas mantles were allowed to come in with a duty calculated only upon the value of the thorium qua thorium contents of the mantle, and not upon the thorium in the form of gas mantles (including the cost of putting it in that form), or unless an effective duty were imposed upon the gas mantle itself. If demands for thorium nitrate from British gas mantle manufacturers were further curtailed by reason of foreign mantle competition, then either the price of thorium nitrate would have to be increased, or the manufacture, of thorium nitrate, and with it cerium and mesothorium would cease. In cross-examination, witness said that 50 per cent. of the capital of Thorium, Ltd., was owned by a gas mantle manufacturing company, but the price was not controlled by mantle manufacturers.

This concluded the evidence for the applicants.

Herr ZIEGLER was then recalled for cross-examination. He did not know that the rates paid in the gas mantle factory of the Auer Co. were the highest paid in any industry in Germany. Under the terms of the Board of Trade's instructions, however, overhead charges did not enter into the matter. Continuing, counsel held that competition was not so severe as seriously to affect employment, owing to the small number of workers engaged in the industry, and it was not unfair competition, because conditions of employment in Germany were not inferior to those in this country.

Mr. SOPER, in his concluding remarks, submitted that the mantle manufacturing industry was of national importance, and repeated the reasons already given, namely, that the gas mantle was the key to modern gas lighting (which was probably the predominant source of artificial lighting to-day), and had enabled great economies to be made in the manufacture of gas. Also, he stressed its importance from the point of view of the amount of coal which was saved annually by the use of the mantle. He held that the whole of the conditions laid down by the Board of Trade had been fulfilled, and pointed out that, if the Board of Trade had not been satisfied in the first place that the industry had made out a *prima facie* case for protection, the present inquiry would not have been held. The quantity of retained imports should be the quantity which would enable the British manufacturers to work economically and sell at a reasonable profit. The year 1920 was the last year in which the industry was in that position, and he asked the Committee, therefore, to adopt that year as a standard.

The Committee's recommendations will be announced in due course.

Lopulco Pulverised Fuel Plant

THE International Combustion, Ltd., of Africa House, Kingsway, states that its associated company, Combustion Engineering, Ltd., has secured the contract for the St. Maurice Lumber Co., through their consulting engineers, McLellan and Junkersfeldt, for the largest Lopulco pulverised fuel plant yet erected in the British Empire. The contract covers a complete Lopulco equipment for four Babcock and Wilcox boilers, each having 10,470 sq. ft. of heating surface with a working pressure of 130 lb. per sq. inch, and the width of each furnace is 17 ft. 7 in. The Lopulco equipment consists of Lopulco feeders and burners, horizontal, and rear wall water screens, Murray fin side walls, 5 six-ton Raymond mills, 5 Lopulco dryers, 5 C.E. airheaters, with forced and induced draught fan equipment.

The guaranteed efficiencies including the airheaters are as follows:—(per cent. of boiler rating) 100, 87·6; 200, 86·8; 300, 84·2.

Mr. E. Brotherton-Ratcliffe in America

Competition Easier than in Great Britain

COMPETITION for chemical sales in America, according to Mr. E. Brotherton-Ratcliffe, managing director of Brotherton-Ratcliffe and Co., Ltd., London, is not nearly so keen as it is in Great Brtiain, although there is less price emphasis abroad.

"American chemical sales," Mr. Brotherton-Ratcliffe stated in an interview with a representative of *Drug and Chemical Markets*, in New York, "are easy, so far as I have observed, compared with the competition which meets us at every turn in Great Britain. There are, however, certain fundamental differences in the market situation in the States and at home. In England, we do not have the over-production which you have in this country, but we have a much more geographical compact sales area and a much better organised chemical distributing trade with the result that the purchases are worked much more intensively than here. Because we are not so over-produced, sales competition is less upon a 'cut throat price basis' than in this country, and there is a much stronger tendency to get a fair sales profit on any business that is done."

Mr. Brotherton-Ratcliffe is on a business trip to the United States of some six weeks' duration, and is expected back in London about June 20.

The Return to Gold

THE benefits which British trade may anticipate from the recent return to the gold standard, and, indeed, the way in which the change is coming about are fast becoming more and more obscure to the ordinary man in the street, as various expert minds continue to discuss its details. The broad lines of the gold policy remain, it is true, quite unimpaired, but some interested parties are now suggesting that the alteration in our monetary affairs originates out of political expediency, and the lay mind may well be alarmed over what has been described as a "revolutionary proposal." Manufacturers and distributors, than whom none other class is more closely concerned with the gold standard, are therefore entitled to demand the unbiased facts and their real meaning. In these circumstances, the timely appearance of a little book, *The Return to Gold*, by Dr. T. E. Gregory, D.Sc.(Econ.) (Ernest Benn, Ltd., 3s. 6d. cloth, 2s. 6d. paper), deserves a wide attention from business men, to whom the clearness of its exposition will undoubtedly appeal.

Very simply the book deals with money as a vehicle of trade and leads on to the consideration of different forms of money, together with the powerful influence which money wields over prices, not only in the home market but also in our foreign trade. Cash and credit permeated the whole of our complicated scheme of buying raw material, manufacturing and selling, and the author's object is to show in an impartial manner that whilst many defects are associated with gold as the basis of transactions, its faults, present and potential, are not nearly so great as the defects which accompany a "paper regime."

We do not live in a perfect world, and money varies in value just as any other commodity. Not infrequently there are variations in that value between different countries on the same day, and only a common standard, acceptable by all countries, will ease the disability and give a measure of stability. In this respect paper currencies issued by individual countries are inadequate as they lack a world-wide circulation. They are not freely acceptable, because their value is at the mercy of the Government which chances to have the power over their issue, and traders with continental experience realise the folly which often results. Gold has a privilege of crossing national borders with the effect of equalising price-levels and foreign exchanges, and, being above political considerations, is more likely to give the trader a safe foundation for his business enterprises.

What is a still wider aspect of the return to gold is the strength which will accrue to national conditions.

The author is an outstanding lecturer on finance in the University of London, and has brought a full study into a lucid treatise, in order to present this vital subject from the business man's standpoint.

Colloidal Phenomena of Petroleum

Review of Recent Research Work

AT the annual general meeting of the London Section of the Society of Chemical Industry on Monday, Mr. C. S. Garland was elected chairman in succession to Dr. Bernard Dyer, and it was announced that an invitation by the Section to the Society to hold its annual general meeting in London in 1926 would formally be made at the annual general meeting of the Society this year at Leeds and that the Council had decided to accept it.

"Colloidics of Petroleum"

Mr. A. E. DUNSTAN, in collaboration with Dr. F. B. Thole and Mr. W. H. Thomas, then read a paper on the "Colloidics of Petroleum." He said that the word "colloidics" was merely a shorthand expression for the colloidal phenomena of petroleum. During the last 40 years those engaged in the petroleum industry had been impressed by the incidence of the colloidal phenomena on the technology of petroleum, and he proposed to give a few examples. Ten years ago, when Dr. Thole and himself were engaged in the investigation of the properties of heavy fuel oils, when dealing with certain heavy fuel oils such as Mexican fuel oil, it was found that the viscosity gradually rose if it were left in a reasonably uniform temperature for, say, a week. In one or two cases also it was found that the viscosity was largely dependent upon the previous thermal history of the oil. That was due to the gelation of the amorphous paraffins in the oil giving a corresponding increase in viscosity, but that gelation could easily be obviated, as was now well known.

The first stage where petroleum technology was involved in colloidal chemistry was on the oil field itself, where emulsions of oil water and asphaltic bodies had to be handled. These emulsions could be separated in various ways, by a special sodium soap, the use of the super-centrifuge, cataphoresis, or by the use of electrolytes. Closely allied with these oil fuel emulsions were the bottom settlings in tanks and pipe lines, which consisted very often of about 1 per cent. of clay, 17·9 per cent. of asphalt insoluble in petroleum ether, and 59·6 per cent. of amorphous waxes. For a long time that kind of emulsion was dumped into the sea, but it was now being very effectively broken up and recovered by super-centrifuging.

In the ordinary process of distillation, a distillate was frequently obtained which was of a colloid nature and was ascribed to the presence of tar fog which had been brought over from the stills through the condensing system into the receiver. That tar fog was generally finely dispersed asphalt in the oil vapours and was a matter of great difficulty to remove effectively. It could be done by effective scrubbing and centrifugal action, but was more frequently removed by treatment with ordinary sulphuric acid. Recent work, however, had shown that this could be more completely carried out by the use of such materials as bauxite, silica gel, and Fullers earth. In the distillation process also there were often obtained persistent emulsions of water in oil due to the dispersion of the condensed water accompanying the oil, and such persistent emulsions could be broken up by filtration or by the effect of heat, pressure, or standing. Still more difficult emulsions frequently met with in the ordinary refining operations and a very familiar method of removing sulphur compounds was the agitation of the sulphur containing oil with a solution of litharge and sodium soda. The use of a small amount of flowers of sulphur was also effective. Emulsions of water in oil were stabilised by the action of caustic soda on the acids present in the petroleum distillate, but such emulsions caused trouble owing to their extreme reluctance to flocculate.

American Colloid Clay Treatment

The practice was being extended in America of treating these emulsions with one of the colloid clays which was spoken of so much now in the United States and which replaced the soda washing. Recent work in America showed quite an advance over the old acid treatment. Some of the clays now being used in America showed an efficiency 20 times as great as that of Fullers earth.

The recovery of natural gasoline from the rich natural gas in the oil fields and refineries by the separating effect of activated charcoal and silica gel had become such a great industry that 10 to 15 per cent. of the world's petrol was now actually obtained by that process. Another interesting effect of colloidal phenomena upon petroleum technology was the manner in which the addition of a few per cent. of ammonium oleate to petrol enabled the compression ratio of an internal combustion engine to be raised from 5 to 1 to 7 to 1. Finally, reference was made to the improvement of the properties of lubricating oil by the addition of a small quantity of fatty acids.

"Ciment Fondu" Successful Tests

A DEMONSTRATION was given last week at Govan of reinforced concrete piling formed of "Ciment Fondu" which was introduced into this country about two years ago. A 40 ft. pile was driven by a two-ton steam hammer until it struck rock, practically at its full depth, when the hammer bounced three inches clear from a three-foot drop. The net time required was 20 minutes, and the operation was in every way successful, although the pile was only 72 hours old. Afterwards a similar pile, of similar age, was lifted and swung by the centre, and one end was raised clear from the ground, without the slightest sign of yielding in either case, although the last test was very severe. It was stated that if ordinary Portland cement had been used the piles could not have been driven until at least six weeks after they were cast, and that many engineers insisted on Portland cement piles being fourteen weeks old.

"Ciment Fondu," which is somewhat expensive at present, is manufactured in France, but works have been under construction for about twelve months in London, and it will be produced in these in about two months' time, and will then be a purely British product. The outstanding features of the cement (which is said to be the greatest advance in cement manufacture for the past fifty years) are :—(1) That it attains a greater strength in twenty-four hours than is obtainable with an ordinary Portland cement in three months; (2) that it continues to increase in strength with age; (3) that it can be used in the severest frost without any protective measures being taken; and (4) that it is absolutely unaffected by the action of sea water.

The Royal Institution

A GENERAL meeting of the members of the Royal Institution was held on Monday, Sir James Crichton-Browne in the chair. Dr. Arthur Compton-Rickett, Messrs. Maurice Alfred Nathan, Theophilus Caldwell Sandeman, and T. Carlton Sutton were elected members. The secretary reported the deaths of Professors Albin Haller and Wilhelm Koerner, honorary members. In connection with the celebration of the centenary of Faraday's discovery of benzene, Prince Ginori-Conti, Professors Gabriel Emile Bertrand, Ernst Julius Cohen, James Flack Norris, Joji Sakurai, and Frederic Swarts were elected honorary members. The Benzene Centenary celebrations will include, on Tuesday, June 16, the anniversary of the discovery, a reception of delegates at 11 a.m. by the president, the Duke of Northumberland, when diplomas of honorary membership will be presented and short addresses delivered. A banquet will be held in the evening in the Hall of the Goldsmiths' Company.

Manganese Alloys

To the Editor of THE CHEMICAL AGE.

SIR,—In connection with your article on manganese alloys, the chloride, $MnCl_2$, is easily reduced by calcium carbide, aluminium or sodium, and alloys of manganese are quite readily obtained by mixing the manganese chloride, calcium carbide, and the other metal and strongly heating in a covered crucible. With copper, silver and even zinc, tin and bismuth alloys of manganese are obtained by introducing the mixture of carbide and manganese haloid into the crucible containing these metals already melted and stirring gently until the reaction is over. The calcium haloid ($CaCl_2$) formed acts as a protective flux. As far as my experience goes, the carbon of the carbide does not enter into the alloy formed.—Yours, etc.,

W. R. HODGKINSON.

Blackheath, S.E.3.
June 9, 1925.

Chile Nitrate and Synthetic Fertilisers

The Effects of Keen Competition

DURING the last few years great developments have taken place in the manufacture of synthetic fertilisers, which have forcibly brought to the attention of the Chilean nitrate producers the necessity for modernising their methods of production so as to reduce costs to a minimum.

The following table shows the world's total consumption of nitrogenous fertilisers and the gradual increase in the proportion of synthetic manufactures :—

Year.	World Total Metric Tons. 000's omitted.	In the form of Chilean Nitrate.		In form of Sulphate of Ammonia, Synthetic By-products, Cyanamide and Nitrate of Calcium.	
		Metric Tons. 000's omitted.	Per cent. of World Production.	Metric Tons. 000's omitted.	Per cent. of Total Production.
1913	823	450	54·7	373	45·3
1914	765	395	51·6	370	48·4
1915	832	280	33·6	552	66·4
1916	1,127	465	41·3	662	58·7
1917	1,251	480	38·4	771	61·6
1918	1,314	460	35·0	854	65·0
1919	880	270	30·7	610	69·3
1920	1,283	405	31·6	878	68·4
1921	651	210	32·3	441	67·7
1922	712	170	23·9	542	76·1
1923	947	305	32·2	642	67·8

From the above table it will be observed that ten years ago Chile supplied 54·7 per cent. of the nitrogen consumed in the world, whereas to-day she only supplies 32·2 per cent. Germany was Chile's principal buyer prior to the war, her purchases frequently falling little short of 1,000,000 tons. To-day she has practically ceased to buy Chilean nitrate. Her production of synthetic fertilisers in 1923 was :—Sulphate of ammonia, 1,250,000 tons ; nitric fertilisers, 350,000 tons ; cyanamide, 200,000 tons.

This is sufficient for home consumption, and in the near future further competition in the form of export will have to be met. The German Nitrogen Syndicate has already obtained permission to export 30,000 tons of pure nitrogen, equal to 200,000 tons of Chilean nitrate. Several other large consuming countries are also rapidly increasing their domestic supplies, and thus diminishing their dependence upon Chilean nitrate.

The total production of Chilean nitrate and its competitors was as follows in 1923 :—

Production.	Production of pure Nitrogen. Tons.	Proportion compared to total production. Per cent.
Chilean nitrate	305,000	32·2
Sulphate of Ammonia (by-product).....	232,000	24·5
Synthetic Ammonia as Sulphate of Ammonia.....	250,000	26·4
Cyanamide, Norwegian	141,000	14·9
Nitrate of Calcium	19,000	2·0
Total	947,000	100·0

During the nitrate year ended June 30, 1924, as in the previous year, the Chilean industry again reached the normal production of later pre-war years, and the prospects are for a similar or possibly slightly increased consumption for the current year.

These details are taken from the recent report of Mr. W. F. Vaughan Scott, Commercial Secretary to the British Legation at Santiago. Mr. Scott states that recent investigations have proved that, at any rate for some time to come, Chilean nitrate has little to fear from synthetic productions.

Japan's Fertiliser Requirements

JAPAN'S fertiliser requirements can be gauged by the following official figures. The imports of fertilisers into Japan for the first half of 1924 amounted to 190,417 tons, representing a value of 15,038,187 yen. The chief imports were (tons) : Nitrate of soda, 2,469 ; sulphate of potash, 326 ; sulphate of ammonia, 8,248 ; phosphorite, 25,824 ; animal bones, 2,908 ; bone dust, 1,503 ; bean cake, 133,493 ; cotton seed cake, 5,523 ; rapeseed cake, 8,078 ; other oil cake, 1,169 ; fish guano, 876 ; total, 190,417.

Power Alcohol from Pine Wood

MR. C. D. RYDER, writing in the *Industrial Australian and Mining Standard*, states that with the object of ascertaining whether or not sawdust and shavings from pine wood could be utilised economically, he made a number of laboratory experiments, basing the latter upon the fact that the residue after heating cellulose with dilute acid for a long time, appeared to possess the characteristics of a reversion product. Pine shavings were moistened with three parts of water, then cooled by means of ice and saturated with hydrogen chloride. The material thus treated was then left for five hours at a temperature of 20° C., after which nearly the whole of the acid was removed by evaporation "in vacuo," at temperatures up to 70° C. The residue was dissolved in water, and the solution, containing about 10 per cent. of material and 1 per cent. of hydrochloric acid, was boiled for eight hours. The saccharification product—reducing sugar—amounted to about 60 per cent., which yielded 18 per cent. of alcohol. The quantity of alcohol was only about 60 per cent. of the theoretical, but, since German experimenters (Blumrich and Wohl) found that when, after a certain period of heating, the solution was separated and fresh dilute acid used, more total reducing sugar could be finally obtained, further attempts to improve the treatment (so far as alcohol is concerned) will be made.

That the yield can be improved has been shown by the laboratory experiments of Drs. Wohl and Krull, who found that by a preliminary digestion with fuming hydrochloric acid, followed by a saccharification with boiling dilute acid, as much as 97 per cent. of the theoretical amount of reducing sugar was obtainable.

Increased Chemical Production in Russia

INCREASED output of sulphuric acid will be one of the considerations of the newly organised Northern Chemical Trust in Russia. Copper smelter gases will be utilised, and until the plants are reciprocally adjusted, the Polyevsky factory (formerly Uralchim) can be adapted. As the market will not take all the output immediately, the production of sodium fluoride, acetic acid, sulphates, etc., will be taken up, the production of these requiring considerable quantities of sulphuric acid. As to other products, the production of muriatic acid, etc., will not develop rapidly, for their sale is even now difficult, with a production of not more than 50 per cent. of pre-war. This, and also the change from the old Weldon process, for producing bleaching powder, to the electrolytic process, will throw further doubt on the wisdom of continuing to run the Bondyuzh factory, the chief products of which are muriatic acid, sulphate, and bleaching powder, by the Weldon process. The Bereznikovsk soda factory, the Schatinsk bichromate factory, and the Perm superphosphate factory will receive attention, and it is hoped to raise the output of superphosphate at the Tchernoretchensk factory to 2,500,000 poods per annum. The Kineschma factory, situated in the centre of the textile industry, will be turned to full account, especially as to mineral colours.

An Australian on British Industry

MR. H. W. GEPP, general manager of the Electrolytic Zinc Co. of Australia, has returned to Australia after a lengthy tour abroad. He was one of Australia's commissioners at the Wembley Exhibition, and, as president of the Australasian Institute of Mining and Metallurgy, represented the Commonwealth at the World Power Conference in London in July last. With Mr. George Klug, he also represented Australia and New Zealand at the Mining and Metallurgy Congress, at which an Empire Council of Mining, Metallurgy and Engineering was formed.

Speaking of his observations, Mr. Gepp said that the Wembley Exhibition was a wonderful success, and should be of lasting benefit to Australia. It was a wise decision to continue the exhibition for another year, as it was doing a great deal to put Australia on the map of the world. The development since the war of the habit of research—scientific, technical, and industrial—was, perhaps, the most encouraging phenomenon he noted. The Government Department of Scientific and Industrial Research was well staffed, and expended nearly £500,000 a year in its work. Its directors were very keen for closer co-ordination with the Dominions, which was very encouraging. Magnificent work is also being done by the Government, municipalities, and medical profession in the prevention and cure of diseases.

U.S. Dye Production Declines

In a preliminary report on the production, sales, exports, and imports of dyes and intermediates during 1924, the United States Tariff Commission says a domestic production of about 67,000,000 pounds of coal-tar dyes, with a value of about $36,000,000, is indicated. This quantity represents a 28 per cent. decline from that of 1923, which was the largest in the history of the industry. The sales of dyes in 1924 were about 63,200,000 pounds, with a value of $35,800,000. This is a 27 per cent. decrease in quantity and a 28 per cent. decrease in value from sales during 1923. The principal reason for the decline in quantity of the dye output in 1924 was the decreased activity of the textile industry. Among other factors contributing to a reduced production were (1) stocks carried over from 1923, amounting to over 7,000,000 pounds; (2) increased imports following the 15 per cent. reduction in the tariff, effective September 22, 1924; and (3) a reduction in exports amounting to 2,211,109 pounds.

Coal-Tar Dye Exports

The total exports of coal-tar dyes in 1924 totalled 15,713,091 pounds, a decrease of 2,211,445 pounds from that of the previous year. The value of the exports in 1924 was $5,635,064, an increase of $69,693 over that of 1923. These figures represent a decline of 12 per cent. by quantity and an increase of 1 per cent. in value. The decline in quantity, in face of a slight increase in value, is probably due to an increase in the quantity of indigo powder (100 per cent.) exported in place of indigo paste (20 per cent.). In this case the exports for 1924 show little change from those of 1923.

New Dyes

Before the war no vat dyes were produced in the United States. After the production of indigo was developed the production of vat dyes was started, and has shown a rapid increase since 1917. At the present time the United States is producing about one-half of its requirements of this group of colours. During 1924 commercial production of several important vat dyes was reported for the first time; these include Golden Orange RRT and G; Hydron Orange R, and Scarlet BB, and several blues and browns.

New dyes also include colours which have been previously imported, in certain cases in large quantities. There were produced in 1924 the prototypes of Diaminogen Blue, Trisulphon Brown B, Geranine, Cyananthrol RXO, and BGAOO. Other additions include representatives of each class of dyes applied to cotton, silk, wool and leather, including several alizarine colours.

A French Air Extractor

The "Chanard Aspirator," a French product for which Mr. Paul Dieny, of 20–21, Laurence Pountney Hill, London, E.C.4, is the U.K. representative, has passed interesting tests at the aero dynamic laboratory of the Eiffel Tower. One "Chanard Aspirator" has produced an ascending air current having a speed equal to 45 per cent. of the speed of the wind, whereas the best aspirator known until then, having the same volume, tested the same day under the same conditions, was stated to produce in the same pipe a speed only equal to 23 per cent. of the speed of the wind. Since then various changes in design enabled 85 per cent. of the speed of the surrounding air to be obtained.

Sculpture in Concrete

Mr. Francis W. Doyle-Jones, the Chelsea sculptor, who recently created interest in art circles by using carved concrete for his statue of Britannia, has produced another noteworthy work in this medium. It is a massive male figure supporting a masonry block, symbolising strength and immutability, and has been commissioned by the British Portland Cement Association for the entrance hall of Portland House, Westminster. Mr. Doyle-Jones states that these statues have been made to demonstrate the possibilities of carved concrete or synthetic stone as a medium of expression for sculpture—particularly when the method of casting the preliminary shape is that of the latest sand mould procedure, a method similar to that used for bronze casting.

Germany's Chemical Industry

Glass Trade Good, Potash Prices Increased

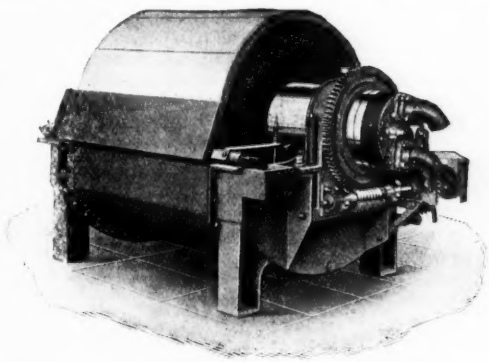
There was, in general, a slight decline in the manufacture of dyes and organic intermediate products in Germany during April, while the production of inorganic and pharmaceutical products showed a small increase. Individual works had to reduce their number of workers by 10 per cent. in order to diminish costs. Prices amounted, on an average, to 100 or 150 per cent. above pre-war prices.

Business in hollow-glass continued satisfactory, and the works were, in general, well employed. Sheet glass works were nearly all producing on the full pre-war scale with adequate sales, so that a shortage of skilled workers and assistants arose.

Employment in the potash industry declined somewhat as compared with the preceding months. Calls from inland customers were fewer, and in many cases foreign orders were also lacking. In spite of this it was calculated that the sales of pure potash in April would amount to approximately 80,000 tons, while in April 1923 only 50,000, and in April 1924 57,000 tons were disposed of. Prices were increased by 5 per cent. on April 16, owing to wages having been twice advanced. The oil and margarine industries showed satisfactory conditions.

Filtration in Industrial Chemistry

The question of filtration is important in many phases of industrial chemistry. The Oliver Filter, manufactured by the Oliver Continuous Filter Co., of 11–13, Southampton Row, London, W.C., San Francisco, and New York, is of no standard construction, and to cater for the great range of products



handled, modifications are made to produce maximum efficiency for each particular use. The filter has been found most effective for dealing with calcium sulphate or carbonate precipitates, washing or thickening wood pulp, dewatering activated sewage sludge, and in the sugar beet industry.

The filter illustrated is constructed for dealing with hot saccharate or other caustic liquors.

New Mordant Dyestuffs

New products have recently been described involving the use of an amino-carboxylic acid in connection with the quinone, the products being dyes that give brown colours on chrome-mordanted wool. Theodore Lombard, of Switzerland (Durand and Huguenin), in *U.S. Patent* 1,503,194, notes that such condensation products formed by the reaction of two molecular proportions of an amino-salicylic acid body with one molecular proportion of chloranil, give dyestuffs by treatment in concentrated sulphuric acid at high temperatures. While the direct condensation product of an amino-salicylic acid body with which chloranil dyes chrome-mordanted wool in shades of brown is of no particular value, the new dyestuff obtained by the sulphuric acid treatment dyes very fast dark violet-blue colours. The introduction of nitro groups into the new dyestuffs serves to intensify the tinctorial property. The new dyes are especially useful in calico printing.

C

The British Association of Chemists

THE annual meeting of the London Section of the B.A.C. was held at 175, Piccadilly, on Tuesday.

Mr. S. R. PRICE, chairman of the Council, recorded an increased membership and referred to the increased prestige of the Association.

Dr. W. R. HARRIS presented his annual report and mentioned the work done to consolidate the section during the year. Members had increased, but they wanted every chemist in London to join them. He much regretted the resignation, through illness, of Mr. S. Mills, assistant secretary, who had served the Association loyally, and Dr. Harris welcomed Mr. Woodley, his successor.

Mr. H. E. J. CORY stated that the finances were satisfactory and the allowance had been kept to.

The following officers were elected: Chairman, S. Reginald Price, M.B.E.; Treasurer, J. C. Mellersh; Secretary, W. R. Harris. Mr. Baker suggested the meetings should be arranged with other societies and Mr. H. Rhodes outlined a scheme which proposes to divide London into eight areas each under the control of a local secretary who would stimulate interest in the Association, and the general principles of the scheme were thoroughly endorsed by the meeting and the Chairman appealed for adequate support for the project.

Canadian Salt Production in 1924

FINAL statistics on salt production as reported by the Mining, Metallurgical, and Chemical Branch of the Dominion Bureau of Statistics at Ottawa, show that the total Canadian output of salt in 1924 was 210,737 tons of which quantity 207,979 tons worth $1,374,780, was marketed. The shipments for the year were slightly higher than in 1923, while the sales value declined 19·8 per cent. Plants operated in Ontario contributed 97 per cent. of the total production; the balance, or 4,551 tons, was made up of shipments from the Malagash mine in Nova Scotia. Imports of salt, all grades, into Canada during the year were equal to 88·8 per cent. of the total Canadian production; Customs' records showed that 182,886 tons valued at $1,134,390 was brought into Canada in the period under review.

PRODUCTION OF SALT IN CANADA BY GRADES, 1924

Grade.	Made.	Sold.	Value of Salt sold (not including pkgs.)
	Tons.	Tons.	$
Table and dairy	41,198	41,134	663,296
Common fine	37,701	36,706	272,301
Common coarse	36,205	34,345	266,895
Land salt	4,920	4,862	23,889
Other grades	7,654	7,873	65,340
Brine for chemical works (salt equivalent sold or used)	83,059	83,059	83,059
Total	210,737	207,979	1,374,780
Value of packages	—	—	548,631
Grand total	210,737	207,979	1,923,411

Crystal Molecule Determination

AT a meeting of the Royal Society of Edinburgh on Monday, Mr. J. Forrest described a new method of discriminating the arrangement of the molecules in a crystal. Whereas the Braggs utilised a beam of X-rays, high magnetic fields were used in this case. Theory gives an estimate of the variations of the internal magnetic force in a crystal when the eternal magnetising field takes all possible orientations about the substance, which is regarded as composed of a regular array of molecular magnets. The components of force parallel and transverse to the field are dealt with, and positions of maxima and minima of these are predicted in any convenient plane of the crystal for any possible lattice arrangement of the centres.

A paper on "The Electrosynthesis of n-Duotriacontane Dicarboylic Acid," by Dr. D. A. Fairweather, was communicated by Sir James Walker. The Crum Brown and Walker synthesis in the series of dibasic acids had been continued, and an acid obtained which had a chain of 34 carbon atoms. This was the highest member of the series at present known.

Chemical Matters in Parliament

Dyestuff Exports

Sir P. Cunliffe-Lister (House of Commons, June 9), in reply to a question by Colonel Day, said that the quantity and value of finished dyestuffs, obtained from coal tar, the produce of Great Britain and Northern Ireland, exported during 1924, amounted to 59,133 cwt., valued at £691,163. The average value per cwt. was, accordingly, £11 13s. 9d.

Phosphate Inquiry

Sir P. Cunliffe-Lister (House of Commons, June 9), in reply to a question, said that the Committee sitting in connection with the superphosphate protection inquiry had practically completed their investigations, and he had no doubt that they would present their report as soon as possible.

U.S. Chemical Trade Committee

AN Advisory Committee from the Chemical Industry has been appointed to co-operate with the Department of Commerce in developing the commercial interests of the U.S. chemical industry. Among the members of the Committee are:

A. Crissy Morrison, Union Carbon and Carbide Co., chairman; Dr. H. E. Howe, editor of the *Journal of Industrial and Engineering Chemistry*, secretary; Dr. Charles H. Herty, president of the Organic Chemical Manufacturers' Association; Dr. A. S. Burdick, Chicago, representing drug manufacturers; Henry E. Howard, Grasselli Chemical Co., representing the heavy chemical industry; Gustavus Ober, Junr., Baltimore; Ernest T. Trigg, Philadelphia, paint and varnish manufacturers; Dr. Leo Baekland, New York; S. W. Wilder, Boston.

At a meeting in Washington the committee discussed the dumping of methanol by the Germans, leuna saltpetre, the synthetic fertiliser being shipped into the United States by Germany, and the possibilities of legislation to make it obligatory upon inventors of chemical processes to work their patents within two years from the time granted or be required to grant licences to manufacturers.

Dr. Herty moved that it be recommended that detailed monthly statistical information as to imports of all chemicals be published for the benefit of the industry.

Subsidising Japanese Dyes

A LAW has recently been passed in Japan concerning the grant of a State subsidy for the advancement of the dye industry. The first article authorises the Government to expend up to 1,000,000 yen per annum for a period of six years as a subsidy for the promotion of the dye industry, although the total outlay in the six years is not to exceed 4,000,000 yen. The types of dyes will be determined by imperial decree. The second article provides that the payment of subsidies will only be made to share companies established according to Japanese law, one-half of whose capital at the least is in the possession of Japanese and who have the majority of the votes. The share companies stated in the first paragraph are placed under the obligation, on receiving instructions from the authorities, to take up the production of dyestuffs which are derived from coal tar distillates. The third article states that the competent Minister will annually determine the amount of the subsidy in such a manner that, based on the market price and the costs of production of the various dyes, a suitable profit will remain for the companies.

Development of Canadian Minerals

MR. HUGH S. SPENCE, mining engineer, of the Mines Branch of the Dominion Department of Mines at Ottawa, has arrived in London in order to represent his Department at the Canadian Pavilion, British Empire Exhibition. He is the author of several of the more recent reports of the Department of Mines on metallic and non-metallic minerals, including bentonite, talc and soapstone, barium and strontium, etc., and will be in this country for several months to give information concerning the possibilities of the development of Canadian minerals. Applications for interviews may be addressed to him, c/o the High Commissioner for Canada, Kinnaird House, Pall Mall East, London, S.W.1.

From Week to Week

THE FIFTH CONGRESS OF CHEMICAL INDUSTRY will be held in Paris on September 27 and following days.

CHEMICAL WORKS AND MINES in Upper Silesia were visited by British M.P.'s now in Poland, on Saturday, June 6.

A SMOKE ABATEMENT BILL is included in the Government's program for next year, according to the Minister of Health.

HYDROGEN PEROXIDE produced by B. Laporte, Ltd., Luton, is now handled in New York and Philadelphia by the Clegg Chemical Co., Inc., New York.

A SUGAR BEET FACTORY in connection with British Sugar Manufacturers, Ltd. will be erected at Wissington, Norfolk, in time for this year's crop.

A GUARANTEE FUND of about £750 to defray expenses of the annual meetings of the Society of Chemical Industry at Leeds in July, is being raised by the Leeds section. Professor J. W. Cobb, Leeds University, is the honorary treasurer.

A STRIKE IS REPORTED at a new tar macadam works at Ulverston. The men demand 1s. 2d. per hour and a definition of overtime periods and rates. Piece workers ask for an increase on the grounds that they cannot possibly make the time rate.

HONORARY DEGREES have been conferred by Liverpool University upon Sir James Colquhoun Irvine (D.Sc.), of St. Andrews, for his work on the carbohydrates, and upon Sir Dugald Clerk (D.Eng.) for his work on the internal combustion engine.

THE LATEST STATISTICAL BULLETIN of the National Federation of Iron and Steel Manufacturers, Caxton Street, Tothill Street, London, S.W.1, contains official figures for all types of iron and steel goods, and covers exports, prices, and European statistics, etc.

MR. JOHN C. BOOT, at the annual meeting of Boots Pure Drug Co., said that the fine chemical section of their business, which was started during the war to supply chemicals formerly imported from Germany, together with the pharmacological section, had made excellent progress during the last year.

DR. W. B. DAVIDSON, whose application in respect of a process for the extraction of toluol from coal gas was recently considered by the Royal Commission on Awards to Inventors is to be recommended to the Treasury for a grant of £350 in respect of all uses, past, present, and future, of his process by the Crown.

A NEW PROCESS FOR THE PRODUCTION OF AMMONIA from coke oven gases is stated to have been discovered by M. Fokin, a Lenin professor of chemistry, and M. Lider, engineer of the Koksbenzol Trust. It is claimed to afford considerable economies to raise the production and it does not injure the apparatus. The new method is being introduced at the Koksbenzol works.

THE TREATMENT OF POTATOES for by-products is to be established by a proposed factory in Australia. The scheme is to manufacture starch and glucose. Glucose is used in large quantities in Australia and 900 tons were imported last year from the United Kingdom and the United States. The manufacture of dextrin is also proposed as at present this is wholly imported.

THE WILL OF THE LATE MR. WALTER WAUGH, of Walter Waugh and Co., Lloyd's Avenue, London, chemical merchants, has been declared at £322,010, with net personalty £257,670. The will of the late Mr. Arthur Boake, of Boake, Roberts and Co., Ltd., Stratford, chemical manufacturers, has been proved at £227,881, and that of Mr. Joshua Hacking, soap manufacturer, of Clayton-le-Moors and the East Lancashire Soap Co., Ltd., at £218,893, with net personalty £218,515.

AN EXTRAORDINARY GENERAL MEETING of The Optical Society was held at The Imperial College of Science, Imperial Institute Road, South Kensington, at 7.30 p.m. on Thursday, June 11, 1925, when the following resolutions were proposed:—"That the annual subscriptions of Fellows and Members be reduced to £2 2s. and £1 1s. respectively and that the entrance fee for all classes of membership be abolished on and after January 1, 1926." At the meeting following The Thermal Syndicate, Ltd., Wallsend-on-Tyne, showed samples of transparent fused silica suitable for optical, illuminating and other purposes.

MR. THOMAS FENDER, a special director of Vickers, Ltd., whose retirement, on medical advice, from the active service of the company was recently announced, was born at Newcastle-on-Tyne 61 years ago. Educated at the Elswick Works School and Institute in that city he served his apprenticeship with Sir W. G. Armstrong, Whitworth and Co., Ltd., at their Elswick Works, and, after filling a staff position as foreman in the gun department, was in due course appointed to the machine inspection department. In 1901 Mr. Fender left Elswick and joined the staff of Vickers, Ltd., at Barrow-in-Furness, with the object of introducing the premium bonus system of payment by results, an achievement which he successfully accomplished, though not without encountering considerable opposition. In 1910 Mr. Fender was appointed works superintendent at Barrow, and in 1919 he was made a special director of the company, a position which he will retain for a further period of two years, in order that the Board may have the benefit of his expert advice.

FIRE DAMAGED a factory belonging to Courtaulds, Ltd., in course of erection at Wolverhampton, on Saturday, June 6.

PROFESSOR F. HABER, inventor of the Haber process for nitrogen fixation, has been elected a director of the Badische Co.

TWO CHIMNEYS, one of 180 ft., previously used for munition manufacture, were felled at Brunner, Mond and Co.'s works at Plumbley, Cheshire, on Wednesday.

CEYLON'S PLUMBAGO EXPORTS TO THE UNITED KINGDOM during 1924 totalled 28,248 cwt., valued at Rs. 142,981. During the same period the United States took 67,685 cwt.

A VISIT TO THE ANTI-GAS SCHOOL at Portsmouth will be included in the programme of the British Association's annual meeting at Portsmouth during August and September.

A NEW ARTIFICIAL SILK company known as the Rayon Manufacturing Co. will have as its head Sir Sydney Skinner, chairman of J. Barker and Co., Ltd. Works will be at Ashtead, Surrey.

SIR HENRY REW, a well-known authority on agricultural questions and formerly Secretary of the Ministry of Food, and Sir John T. Davies have joined the committee of the British Sugar Beet Society.

THE "PEREIRA MEDAL," stated to be the second highest award in Chemistry and Materia Medica for Great Britain, has been awarded to Mr. C. W. Peck, of Birmingham, by the Pharmaceutical Society of Great Britain.

THE ANNUAL AUTUMN MEETING of the Institute of Metals will take place in Glasgow from Tuesday, September 1, to Friday, September 4. The fourth annual autumn lecture will be delivered by Sir John Dewrance, vice-president.

PROFESSOR ROBERTO LEPETIT has been elected president of the Italian Society of Chemical Industry for 1925–8. Dr. Lepetit is a well-known expert in the tanning extract industry and has carried out much research work in this connection.

THE PROHIBITION OF BACTERIOLOGICAL METHODS OF WARFARE is to be a clause added to the clause at present prohibiting poison gases adopted by the general committee of the International Conference for the limitation of the Traffic in Arms, at Geneva.

APRIL DYE IMPORTS into the United States amounted to 456,005 lb., valued at $426,141; medicinals, intermediates, photographic developers and other coal tar products 34,213 lb., value $26,743; colour lakes 15,660 lb., value $6,167; and synthetic aromatic chemicals 15,020 lb., value $33,543.

THE MIDLAND GLASS TRADE is feeling most acutely the severity of Continental competition, particularly in the cheaper lines of domestic and fancy glass ware. Another furnace in the Stourbridge district has been closed. The hope is entertained that it may be possible to prove to the Board of Trade that the industry is of "national importance" and thus enable it to secure relief under the Safeguarding of Industries Act. More attention is being given by Midland manufacturers to the highest grade of products and some of their finest cut glass will be seen at the forthcoming Paris Exhibition.

AT THE ROYAL SOCIETY MEETING on Thursday, June 18, 1925, at 4.30 p.m., papers to be read include "Luminous Vapour from the Mercury Arc and the Progressive Changes in its Spectrum," by Lord Rayleigh, F.R.S.; "Gaseous Combustion at High Pressures, Part V," by W. A. Bone, F. R. S., D.M.Newitt and D. T. A. Townend; "The Effect of Infra-Red Radiation upon the Rate of Combustion of Inflammable Gaseous Mixtures," by W. T. David. Communicated by Sir Dugald Clerk, F.R.S. "The Kinetic Theory of Surface Films," by R. K. Schofield and E. K. Rideal. Communicated by Sir William Hardy, Sec.R.S.; Papers to be read in title only include "The Application of X-Rays to the Study of Alloys," by H. Weiss. Communicated by Sir William Bragg.

AT A MEETING of the Worcester County Executive Committee of the National Farmers' Union last week, a list was read of the charges for the various analyses made by the county laboratories, These included: water for domestic purposes, 10s.; bacteriological examination of water, £1 1s.; sewage or sewage effluent, £1 1s.; fertilisers and feeding stuffs (with warranty), 5s., (without warranty), 10s. 6d.; soils (partial analysis for agricultural purposes), £1; soils (complete analysis), £1 10s. The Chairman (Mr. A. Green) mentioned that there had been some criticism about the item of 10s. 6d. for the analysis of fertilisers and feeding stuffs. He pointed out that when a warranty was sent, a charge of 5s. was considered reasonable. The only criticism he had heard was with regard to 10s. 6d. without warranty, but he understood that when no warranty was sent, two analyses were necessary, and therefore farmers ought to send a warranty with the sample.

Obituary

MRS. H. D. M'TEAR, widow of Mr. James M'Tear, at one time partner in Charles Tennant and Co., chemical manufacturers, St. Rollox.

Mr. WILLIAM JOSEPH DIBDIN, F.I.C., F.C.S., at West Norwood, on Tuesday, aged 74.

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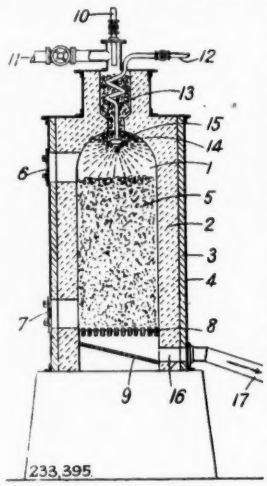
233,395. Cracking and/or Hydrogenation of Liquid Hydrocarbons. G. W. Wallace, 1,340, Mission Street, San Francisco, Cal., U.S.A. Application date, February 1, 1924.

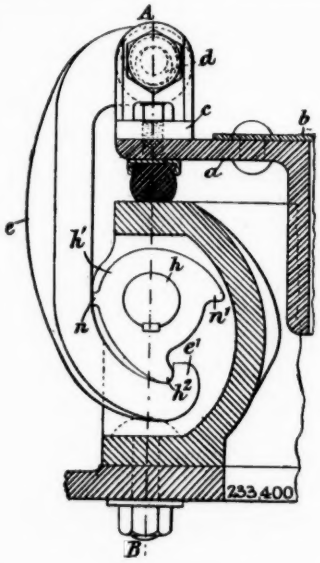
The process is for cracking and/or hydrogenating shale or petroleum oils or naphthalene oils, anthracene oils, etc. The oil is atomised in contact with a downwardly directed flaming zone of gaseous combustion. The products pass downwards through a packing of solid material which assists the chemical changes. The liquid may be mixed with finely divided catalytic material such as kieselguhr impregnated with nickel. Steam may be injected into the vaporised material.



The chamber 1 has a firebrick lining 2 and insulating layer 3, and is partly filled with carbon 5 impregnated with a catalyst. Combustible gas is passed in through a pipe 10, and air through a pipe 11. The oil to be treated is passed in through a pipe 12, and is sprayed at 15, where it meets a zone of hot gas generated by surface-combustion in a mass of carborundum 13. The combustion products and cracked oil pass out through an outlet 16 to a dephlegmator 18, where the heavier oils are washed out, and the vapour passes on to a condenser. The condensate may be fractionated, and the vapour passed through a scrubber. In a modification, a hydrogenating gas may also be passed into the chamber 1.

233,400. Purification of Gases, Apparatus for. T. A. Clapham, Norwood House, Keighley, and R. J. W. Clare, 43, Caledonia Road, Keighley, Yorks. Application date, February 4, 1924.

This invention is a special securing device for the lids or covers of gas purifiers. The rim *a* of the purifier lid *b* carries



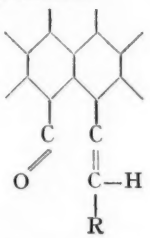
a number of brackets *c* on which links *e* are pivoted at *d*. A rotatable shaft *h* is supported in brackets by the purifier, and carries a hub h^1 having a projection h^2. To lock the purifier lid, the shaft *h* is turned until the projection h^2 engages the end e^1 of the link *e* and carries it into a position beyond the axis A B. Packing material *m* is engaged between the purifier and lid. When disengaging the locking device, a projection n^1 moves the link *e* outwards so that it is held clear while the lid is being raised.

233,426. Lakes of the Basic Dyestuffs, Manufacture of. Colloisil Colour Co., Ltd., 116, Chestergate, Stockport, Cheshire. (From W. Eberlein, Kochel, Upper Bavaria, Germany.) Application date, February 7, 1924.

In the known processes the percentage of colour which can be fixed by means of natural or artificial silicates is only 1–3 per cent., but in the present invention it has been found that a much larger proportion can be fixed if a basic dyestuff is treated with natural or artificial silica in the presence of fluid. As an example of such silica, neuburger kieselkreide is given.

233,452. Vat Dyestuffs, Manufacture of. S. Sokal, London. (From Kalle & Co. Akt. Ges., 23, Rheinstrasse, Biebrich-on-Rhine, Germany.) Application date, February 16, 1924.

Vat dyestuffs are obtained by fusing with alkaline agents compounds having the formula



where R is an aryl group, substituted or not. In an example, benzylidenacenaphthenone is fused with caustic potash, yielding a product soluble in water, giving a red solution. Air is blown in to precipitate the dyestuff. This is a black powder giving a red vat with alkaline hydrosulphite which dyes cotton blue. Other condensation products of acenaphthenone with other aldehydes may be used, e.g., chloro-, oxy-, or amino-aldehydes of the benzene, naphthalene or anthracene series. Examples are also given using ortho-oxybenzylidenacenaphthenone (obtained from acenaphthenone and salicylaldehyde), α-naphthylidenacenaphthenone, and the condensation product from β-anthraquinonealdehyde and acenaphthenone.

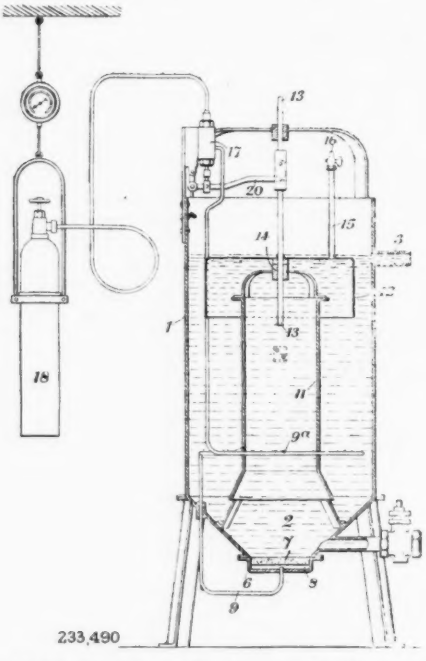
233,470. Thorium or Bodies Coated with Thorium or with an Alloy or Mixture thereof, Manufacture of. A. S. Cachemaille, London. (From Westinghouse Lamp Co., Bloomfield, N.J., U.S.A.) Application date, February 27, 1924.

Thorium is deposited electrolytically from an aqueous solution of a double salt of thorium and another metal, and the other metal is subsequently removed. According to examples, a solution of thorium hydroxide in fluoboric acid, mixed with lead hydroxide or carbonate is used; and also a mixture of neutral potassium lactate with thorium chloride and ferrous chloride or lead chloride. A detailed description is given of a method of electrolytically depositing thorium on wire or filament. The other metal deposited with the thorium is volatilised.

233,490. Absorption of Gases by Liquids or Solutions or Suspensions of Solids in Liquids. H. D. Golding, J. W. Pritchard, and the United Alkali Co., Ltd., Cunard Building, Liverpool. Application date, March 21, 1924.

This apparatus is particularly designed for use in the production of hypochlorite solutions. An open vessel 1 is provided with a conical bottom 2 having a cover 6 which encloses a permeable diaphragm 7. The gas to be absorbed is introduced by the pipe 9 into the space 8 between the cover 6 and diaphragm 7 so that it passes into the liquid in a very finely divided condition. The pipe 9 surrounds an open-ended cylinder 11 as a coil 9^a, and is connected through a valve 17 to a cylinder of compressed gas 18. The cylinder 11 is surrounded by a hood 12 having a gas outlet pipe 15 and valve 16. A rod 13 carried by the hood 12 operates the valve 17 through a lever 20. The absorbing liquid is admitted through the pipe 3 to cover the hood 12 and also fill it. The valve 16 is then

closed and gas admitted through the pipe 9. If all the gas is not absorbed, the excess collecting in the hood 12 lifts it, and partly closes the valve 17. If the vessel 1 is closed at the top, the hood 12 is replaced by a float. A device is also described to prevent back flow of liquid into the cylinder 18 when the latter is empty.



NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—213,889 (H. Pereira), relating to manufacture of vat dyes, see Vol. X., p. 603 ; 214,657 (Electrolytic Zinc Co. of Australasia, Ltd.), relating to electrolytic recovery of zinc, see Vol. X, p. 681 ; 215,011 (Elektro-Osmose Akt.-Ges.—Graf Schwerin Ges.), relating to manufacture of amorphous silicic acid, see Vol. XI, p. 17 ; 217,568 (Höganäs-Billesholms Aktiebolag), relating to production of aluminium oxide, see Vol. XI, p. 174 ; 218,255 (Farbwerke vorm. Meister, Lucius, and Brüning), relating to vat dyestuffs of the dibenzanthrone series, see Vol. XI, p. 223 ; 219,673 (Farbwerke vorm. Meister, Lucius, and Brüning), relating to manufacture of dyestuffs, see Vol. XI, p. 331 ; 223,543 (Petrole Synthetique), relating to the synthetic manufacture of hydrocarbons by the electrical method, see Vol. XI, p. 630.

International Specifications not yet Accepted

231,468. BORNEOL. Soc. Alsacienne de Produits Chimiques, 62, Boulevard Haussmann, Paris. International Convention date, March 28, 1924.

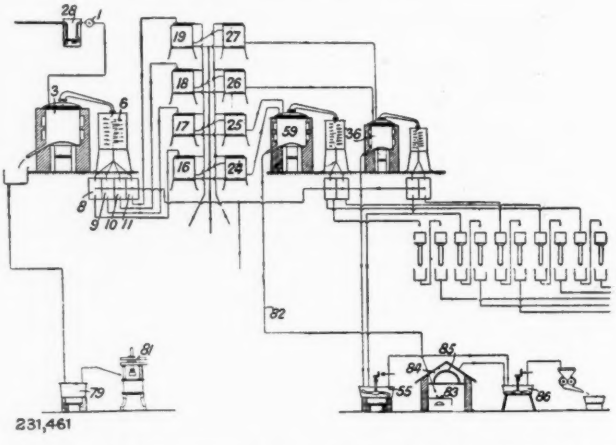
Pinene or camphene is treated with an acid and the resulting ester hydrolysed to obtain borneol. The acid is of the type COOH-R-CO-R¹, where R and R¹ are aromatic nuclei, their homologues and substitution products such as *o*-benzoylbenzoic acid, *o*-naphthoylbenzoic acid, 2 : 3-dichlorobenzoylbenzoic acid, 3 : 4-dichlorobenzoylbenzoic acid, 2 : 4-dichlorobenzoylbenzoic acid, tetrachlorobenzoylbenzoic acid, naphthoyltetrachlorobenzoic acid, and various derivatives. The esters are hydrolysed with caustic soda.

231,501. SYNTHETIC RESINS. A. Danilowitsch and G. Petroff, 7, Armianski, Moscow. International Convention date, March 25, 1924.

Phenol is condensed with formaldehyde in the presence of naphthalene-α-sulphonic acid. Glycerine and fusel oil are added to retard hardening, which is afterwards effected by heating.

231,461. DISTILLING HYDROCARBONS. Benzonaftene, 7, Via Meravigli, Milan, Italy. International Convention date, March 10, 1925.

The liquid hydrocarbons obtained in the process described in Patent Specification No. 231,459, published last week, pass from a tank 28 to a still 3, and the vapour passes to a condenser 6. The fractional condensates 8, 9, 10, 11 are treated with concentrated sulphuric acid in vessels 16, 17, 18, 19, and caustic soda in vessels 24, 25, 26, 27. The two low-boiling fractions pass in succession to a still 59 and the two higher-boiling fractions to a still 36. The separate fractions are passed over calcium and magnesium oxides and animal charcoal. The residue from the still 3 may be used for making an electric insulating composition, and that from still 59 may be burned to obtain lampblack. The residue from still 36 is mixed with the distillate and with manganese dioxide and colophony to yield a siccative oil similar to boiled linseed oil.



231,512. SYNTHETIC DRUGS. P. Pfeiffer, 98, Meckenheimer Allee, Bonn, Germany. International Convention date, March 27, 1924.

Diethyl-barbituric acid is combined with 4-dimethylamino-2 : 3-dimethyl-1-phenyl-5-pyrazolone in molecular proportions in a small quantity of solvent, or a more dilute solution is made and concentrated.

231,529. DYES AND LAKES. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, March 29, 1924.

To produce azo dyes in substance or as lakes, or on the fibre, 2 : 3-oxynaphthoic arylides are coupled with the diazo compounds of 2-amino-4-aroylamino-1-alkyloxy or-aralkyloxy-benzenes not containing a free hydroxyl, sulphonic or carboxylic group. Diazo compounds include the 2-amino-4-benzoylamino-1-anisol and its derivatives substituted in the benzoyl group by chlorine, alkyloxy, or alkyl. The methoxy group of the anisol may be replaced by ethoxy, benzyloxy, etc. The 2-amino-aroylamino-1-alkyloxy or -aralkyloxy-benzenes are obtained by condensing aroyl chlorides with 2-nitro-4-amino-1-alkylozy or -aralkyloxy-benzenes and reducing.

231,532. DYES. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, March 31, 1924.

These dyes give yellow to red shades on cotton, and have the general formula

X.CO.NH.A.NH.R.NH.A.

where R is the radicle of a dibasic acid such as —CO—, —CO.CO—, —CO,CH_2.CO—, CO.CH_2.CH_2.CO—, CO.C_6H_4.CO—, or —CO.CH_2.CH_2.CH_2.CH_2.CO—. A is an anthraquinone residue, and X.CO.NH— an α-aroylamino group which may be substituted by halogen, acidylamino, alkyl, aryl, oxyalkyl, or oxyaryl groups. The products are obtained (1) by nitrating a dianthraquinonyl diamide such as di-α- or β-anthraquinonyl urea or -succindiamide, reducing and aroylating ; (2) by condensing an α-nitro-aminoanthraquinone with a dibasic acid or its anhydride or chloride, reducing, and aroylating ; (3) by condensing an α-aroyl-amino-aminoanthraquinone with a dibasic acid, etc. ; (4) by condensing an α-aroylamino-anthraquinonyl-monoamide of a dicarboxylic acid with an aminoanthraquinone ; (5) condensing a dibasic acid dichloride with an α-aroylamino-aminoanthraquinone and then at a higher temperature with another α-aroyl-amino-aminoanthraquinone. A number of examples are given.

(*Continued on page* 591)

(*Continued from page* 590)

231,536. SULPHURIC ACID. Lodge-Cottrell, Ltd., 51, Great Charles Street, Birmingham. Assignees of Lurgi Apparatebau Ges., 17, Gervinusstrasse, Frankfurt-on-Main, Germany. International Convention date, March 31, 1924.

The sulphur dioxide gases are electrically purified from dust and arsenic, and the heat lost is supplied from a denitrating device before admission to the chambers.

231,800-1-2-7-9; 231,810. CELLULOSE DERIVATIVES. L. Lilienfeld, 1, Zeltgasse, Vienna. International Convention date, April 4, 1924.

231,800. Cellulose derivatives are obtained by treating a cellulose xanthic acid or a cellulose xanthate with a halogen fatty acid or a salt, ester or other derivative of the acid. Suitable halogen fatty acids are monochloracetic, α-bromopropionic, and α-bromobutyric. The products are soluble in water, ammonia, aliphatic and aromatic bases, or caustic alkalies, depending on the relative proportions of the ingredients. The products are precipitated with a dehydrating agent such as alcohol or acetone, or with an acid or acid salt.

231,801. The products obtained as in 231,800 above are treated with a derivative of ammonia in which at least one hydrogen atom is substituted by an alcohol radicle, and in which at least one replaceable hydrogen atom remains. Examples of such derivatives are aniline, orthotoluidine, ethylamine, diethylamine, methylamine, and phenylethylamine. The two processes may be combined in one operation.

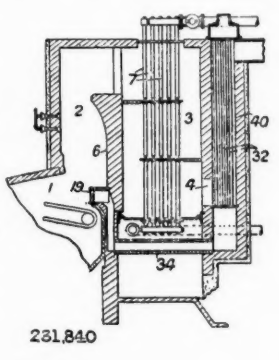
231,802. The products obtained in 231,800 above, particularly by using monochloracetic acid, α-bromopropionic acid α-bromobutyric acid, or bromsuccinic acid are treated with ammonia, or the two operations may be combined. The products are insoluble in water, soluble in aqueous alkalies, and are precipitated by substances which neutralise ammonia.

231,809. The process for obtaining cellulose derivatives as above is carried out in the absence of alcohol, or in the presence of not more than 20 parts of alcohol for each 100 parts of water. The proportion of halogen fatty acid is inversely proportional to the strength of the alkali solution. Other detailed conditions necessary for carrying out the process are also given.

231,810. The above cellulose derivatives are obtained by treating cellulose or an alkali-insoluble conversion product with a monohalogen fatty acid or salt, ester, or other derivative in the presence of caustic alkali and an aliphatic alcohol, the molecular proportions of halogen fatty acid to caustic alkali being less than 0·5 to 1. Particulars are given of the manufacture of various articles from these cellulose derivatives.

231,840. CRACKING HYDROCARBONS. Sinclair Refining Co., 45, Nassau Street, New York. Assignees of L. R. Bell, 100, Broadway, New York. International Convention date, April 1, 1924.

In a tubular oil still, the tubes 7 are shielded by a bridge 6 from direct radiation from the furnace 1, and the hot gases pass over the top of the bridge into the chamber 3. The gases then pass through a flue 4 to a chamber 40 containing tubes 32 through which air or gas is passed to preheat it. This gas passes through the flue 34 to mix with the furnace gases and reduce their temperature before they pass into the still.



231,840

LATEST NOTIFICATIONS.

234,806. Manufacture of new cyclic amino-metal-mercapto compounds or salts thereof. Chemische Fabrik Auf-Actien (Vorm. E. Schering). June 2, 1924.

234,826. Treatment of sulphide ores or sulphidic metallurgical products. Krupp Grusonwerk Akt.-Ges., F. May 30, 1924.

234,830. Process for producing aluminium oxide or products containing aluminium oxide. Haglund, T. R. June 2, 1924.

234,852. Manufacture of hydrofluoric acid. Buchner, M. June 2, 1924.

Specifications Accepted with Date of Application

207,551. Fats or oils, Process for treating. P. M. Heyerdahl. November 25, 1922.

211,886. Highly active adsorption carbon, Method of manufacturing. Ges. fur Chemische Produktion. February 22, 1923.

214,273. Volatile constituents from materials, Process for refining or separating. H. M. Lamy-Torrilhon. April 14, 1923.

218,629. Aluminium compounds for paper-making purposes and other industrial uses, Production of. Amber Size and Chemical Co., Ltd., July 2, 1923.

233,831. Indigoid dyestuffs, Manufacture of. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) June 12, 1923.

234,149. Filtering or sterilising liquids, Process of. H. E. Potts, (*Naamlooze Vennootschap Algemeene Norit Maatschappij.*) December 20, 1923.

234,161. Carbon or carboniferous products, Production of. S. G. S. Dicker. (*G. W. Wallace.*) January 25, 1924.

234,163. Organic peroxides or other organic percompounds, Process for rendering safer for handling or application purposes. Naamlooze Vennootschap Industrielle Maatschappij Voorheen Noury and Van der Lande, and J. C. L. Van der Lande. February 12, 1924.

234,173. Vat dyestuffs of the dibenzanthrone series, Manufacture of. O. Y. Imray. (*Farbwerke vorm. Meister, Lucius and Brüning.*) February 20, 1924.

234,192. Hexamethylenetetramine, Manufacture of. H. Wade. (*S. Karpen and Bros.*) February 26, 1924.

234,197. Crystallisation and drying of soluble substances. J. T. Millar. February 29, 1924.

234,234. Liquids, Process of heating and distilling, and apparatus therefor. E. C. R. Marks. (*Grasselli Chemical Co.*) March 31, 1924.

234,263. Dyestuff intermediate, Manufacture of. British Alizarine Co., Ltd., J. Anderson, and W. H. Dawson. May 6, 1924.

234,319. Substantive Azo dyestuffs, Manufacture of. Soc. of Chemical Industry in Basle, and H. Fritzsche. July 22, 1924. Addition to 219,653.

234,377. Low-grade iron ores containing a large proportion of silicic acid, Process for the preparation of. E. C. R. Marks. (*Maschinenbau-Anstalt Humboldt.*) November 11, 1924.

Applications for Patents

Adam, T. W., and Jarvis, A. Prevention of caking of sulphate of ammonia. 14,506. June 4.

Akt.-Ges. für Anilin-Fabrikation. Manufacture of sulphur dyestuffs. 14,699. June 5. (Germany, June 14, 1924.)

(Badische Anilin- and Soda-Fabrik), and Johnson, J. Y. Manufacture of vat colouring-matters. 14,344. June 2.

Baily, A. H., and Kirby, J. N. Manufacture of soaps. 14,769. June 6.

British Dyestuffs Corporation, Ltd. Vulcanisation of rubber, etc. 14,479. June 4.

British Dyestuffs Corporation, Ltd., and Perkin, W. H. Manufacture of anthraquinone dyestuffs. 14,480. June 4.

Buchner, M. Manufacture of hydrofluoric acid. 14,357. June 2. (Germany, June 2, 1924.)

Chance Bros. and Co., Ltd., Gell, P. V. W., and Martin, H. S. Crookes glass. 14,676. June 5.

Chemische Fabrik Dr. H. Stoltzenberg. Manufacture of tartaric acid. 14,726. June 6. (Germany, November 5, 1924.)

Chemische Fabrik Griesheim-Elektron and Mond, A. Production of silico-fluorides, etc. 14,461. June 4.

Continentale Akt.-Ges. für Chemie. Production of ammonium chloride and alkali sulphate. 14,258. June 2. (Germany, June 11, 1924.)

Cronshaw, C. J. T., and Naunton, W. J. S. Vulcanisation of rubber, etc. 14,479. June 4.

Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. Preparation of derivatives of organic arsenical compounds. 14,483. June 4. (Austria, June 18, 1924.)

Dreyfus, C. Manufacture of products containing cellulose. 14,763. June 6.

Everest, A. E., and J. W. Leitch and Co., Ltd. Sulphonation of aromatic amines. 14,364. June 2.

Fleming, Birkby and Goodall, Ltd., and Marriott, R. H. Treatment of hides, etc. 14,592. June 4.

Harris, J. E. G., Scottish Dyes, Ltd., and Wylam, B. Dyes and dyeing. 14,470. June 4.

Hjort, J. Process of extracting fat from bones. 14,591. June 4.

Hollins, C. Manufacture of anthraquinone dyestuffs. 14,480. June 4.

Marshall, F. D. Distillation, etc., of carbonaceous, etc., materials. 14,664, 14,709, 14,718. June 5.

Naamlooze Vennootschap Philips Gloeilampenfabrieken. Manufacture of rods, etc., of large tungsten, etc., crystals. 14,643. June 5. (Holland, June 6, 1924.)

Naamlooze Vennootschap Philips Gloeilampenfabrieken. Process of dissolving a mixture of hafnium and zirconium salts and of separating hafnium and zirconium. 14,696. June 5. (Holland, June 6, 1924.)

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

June 12, 1925.

BUSINESS continues quiet, with little, if any, feature to report. Trade in the North, has, of course, hardly reopened, so that any definite broadening in the demand cannot be expected until towards the end of the week.

Prices remain very steady with stocks light. Export demand has been somewhat better.

General Chemicals

ACETONE continues in short supply and the material is quoted to-day at £77 per ton, ex store.

ACID ACETIC is unchanged in value and is in ready demand at £39 per ton for 80% Technical and £40 per ton for 80% Pure.

ACID CITRIC continues in poor demand at 1s. 5d. per lb. less 5%, but with any increase in trade this price seems certain to advance.

ACID FORMIC continues moderately active at £49 per ton and £50 for 85%.

ACID LACTIC trade has broadened somewhat and the material is extremely firm at £43 per ton for 50% by weight.

ACID OXALIC is slow, but the quotation is unchanged at 3¾d. per lb.

ACID TARTARIC is quiet at 11½d. per lb., with little interest being shown in forward business.

ALUMINA SULPHATE competition continues, but the price appears to have reached a limit where further concessions in value seem almost impossible; the nominal value to-day is about £6 5s. per ton for 17/18%, ex store.

ARSENIC is in slightly better inquiry, but the quotations remain about £24 to £25 per ton.

BARIUM CHLORIDE has not improved in value, but the demand is quite good at £9 15s. to £10 per ton.

CREAM OF TARTAR has been very active, and is now quoted at £74 to £78 per ton, according to quantity and quality.

EPSOM SALTS unchanged with a slightly firmer tendency.

FORMALDEHYDE is exceedingly quiet; price is £40 to £44 per ton.

LEAD ACETATE is firmer in sympathy with the metal and the demand is moderate; price is about £45 10s. for white and £43 10s. for brown.

LIME ACETATE is weaker and is quoted at about £14 15s. per ton for grey and £9 10s. for brown.

METHYL ALCOHOL is stagnant, but all the same stocks are practically non-existent; the material is quoted at £45 per ton, c.i.f. main ports.

POTASSIUM CHLORATE is as scarce as ever and price is about 4½d. per lb.

POTASSIUM PRUSSIATE has taken an upward turn and is in good demand at 7½d. to 7¾d. per lb.

SODIUM ACETATE is quiet at £21 5s. per ton.

SODIUM BICHROMATE.—Nominal demand with price unchanged.

SODIUM HYPOSULPHITE.—Price here is unchanged at British makers' figures, but considerably better demand could be wished for.

SODIUM PRUSSIATE is firm at 4½d. to 4¾d. per lb.

SODIUM NITRITE is fairly active, but price is unchanged at £22 10s. to £22 15s. per ton.

ZINC SULPHATE is brighter and there is a fair demand at round about £13 per ton.

Coal Tar Products

The quiet tone of the market in coal tar products is maintained.

90% BENZOL is unchanged at 1s. 8d. to 1s. 9d. per gallon on rails.

PURE BENZOL is quoted at 1s. 10d. to 1s. 11d. per gallon on rails.

CREOSOTE OIL is quiet, but the price is unchanged at 5¾d. to 6d. per gallon on rails in the North, while the price in London is 7d. to 7¼d. per gallon.

CRESYLIC ACID has little inquiry, and is quoted at 1s. 8d. to 1s. 9d. per gallon on rails in bulk for the Pale quality, 97/99%; while the Dark quality, 95/97%, is quoted at 1s. 6d. to 1s. 7d. per gallon on rails.

SOLVENT NAPHTHA is steady at 1s. 3d. to 1s. 3½d. per gallon on rails.

HEAVY NAPHTHA is worth 1s. 1d. to 1s. 2d. per gallon on rails.

NAPHTHALENES are quiet, the lower grades being worth from £3 to £3 15s. per ton, while the 74/76 quality is quoted at £5 to £5 10s. per ton, and 76/78 quality at £6 to £6 10s. per ton.

PITCH remains dull, and very little interest is shown for next season. To-day's approximate values are more or less nominal at 40s. to 42s. 6d. per ton, f.o.b. main U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL closed steadier at about unchanged rates. Spot, £45 10s.; June, £44 5s.; July/August and September-December, £44 10s., sellers. RAPE OIL steady. Crude crushed, spot, £50 10s.; and technical refined, £53 10s. COTTON OIL quiet. Refined common edible, £47; Egyptian crude, £42 10s.; and deodorised, £49. TURPENTINE slow at 1s. 9d. to 1s. decline. American spot, 70s.; June and July-December, 69s. per cwt.

HULL.—LINSEED OIL, naked, spot, June, July-August, and September-December, £44 5s. COTTON OIL, naked, Bombay, crude, £38 2s. 6d.; Egyptian, crude, £41 15s.; edible, refined, £45 5s.; deodorised, £47 5s.; technical, £41 10s. PALM KERNEL OIL, crushed, naked, £42 10s. GROUNDNUT OIL, crushed, extracted, £48 10s.; deodorised, £52 10s. SOYA OIL, extracted, £42 10s.; crushed, £43 10s.; deodorised, £48. RAPE OIL, extracted, £49 10s. per ton, net cash terms, ex mill. CASTOR OIL: Pharmaceutical, 63s. to 64s.; first, 58s. to 59s.; and seconds, 56s. to 57s. COD OIL, spot, 31s. 6d. to 32s. 6d.

Nitrogen Products Market

Export.—The demand for export has been fairly quiet for prompt delivery, but producers have sold useful quantities for forward. Producers are holding firmly for £12 2s. 6d. per ton f.o.b. double bags, June-July shipment. It is the policy to raise prices gradually as the season advances, just as the Germans have announced a sliding scale of prices for delivery in Holland and certain other countries.

Home.—Home prices for June are £12 5s. per ton, basis 21·1 per cent. nitrogen, for neutral quality delivered to consumer's nearest station in 4-ton lots. The home demand is normal for this period of the year. Only small sales have been made in addition to the sales for fertiliser mixers. The big drop in the prices both for home and export is the inevitable consequence of increased production by synthetic processes both at home and abroad. The very low figures now being quoted should give the producers in all countries an opportunity of raising their prices substantially as the season advances.

Nitrate of Soda.—The nitrate of soda market is firm. Cargoes are changing hands at £11 13s. to £11 17s. per ton. For the new season producers have fixed prices at 1s. per ton above the scale of last year, but in order to encourage the demand they have announced that should prices be lowered later the buyers for July/August will benefit *pro tanto* by the fall. It seems that the nitrate position is a precarious one, and that the directorate, though fixing such a high scale, are dubious of the effects it will have.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£21 to £23 per ton.
Acid Boric, Commercial.—Prices reduced by £5 per ton. Crystal, £40 per ton, Powder, £42 per ton.
Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.
Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £10 10s. d/d; Contract, £10 d/d. 4 ton lots.
Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
Copper Sulphate.—£25 to £25 10s. per ton.
Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
Nickel Sulphate.—£38 per ton d/d. Normal business.
Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—5d. per lb.
Potassium Chlorate.—2¾d. to 3d. per lb.
Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.
Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£24 per ton.
Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
Sodium Bichromate.—4d. per lb.
Sodium Bisulphite Powder 60/62%.—£16 to £17 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.
Sodium Chlorate.—2¾d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.
Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.
Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.
Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—5d. per lb. Quiet demand. Crude 60's, 1s. 5d. to 1s. 6d. per gall. Demand negligible.
Acid Cresylic 97/99.—1s. 8d. to 2s. per gall. Fair business. Pale, 95%, 1s. 6d. to 1s. 10d. per gall. Dark, 1s. 6d. to 1s. 9d. per gall. Little demand.
Anthracene Paste 40%.—3d. to 4d. per unit per cwt.—Nominal price. No business.
Anthracene Oil, Strained.—7d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.
Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons.
Toluol.—90%, 1s. 7d. to 1s. 8d. per gall. More inquiry. Pure, 1s. 11d. per gall.
Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
Creosote.—Cresylic, 20/24%, 8d. to 8½d. per gall. Little demand. Middle Oil, Heavy, Standard specification, 5½d. to 6½d. per gall., according to quality and district. Market steady.
Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 5d. per gall. Demand good. Solvent 90/190, 1s. 4d. per gall. Steady business.
Naphthalene Crude.—Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand falling off. Whizzed or hot pressed. £6 to £9 per ton.
Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts. Very quiet.
Pitch.—Medium soft, 35s. to 40s. per ton, according to district. No export business until next season.
Pyridine.—90/160, 19s. to 19s. 6d. per gall. Market more active. Fair demand. Heavy, 11s. 6d. to 12s. per gall. More inquiry.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid H.—3s. 9d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
Acid Salicylic, technical.—11d. to 11½d. per lb. Steady demand.
Acid Sulphanilic.—9d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—10d. per lb. d/d.
Aniline Oil.—7½d. per lb. naked at works.
Aniline Salts.—8d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzidine Base.—3s. 8d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 29/31° C.—3d. per lb. Demand quiet.
m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. per lb.
Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
p-Dichlorbenzol.—£85 per ton.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. 2d. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. per lb. naked at works.
Dinitrochlorbenzol.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
G. Salt.—2s. 2d. per lb. 100% basis d/d.
Monochlorbenzol.—£63 per ton.
a-Naphthol.—2s. 3d. per lb. d/d.
B-Naphthol.—1s. per lb. d/d.
a-Naphthylamine.—1s. 3½d. per lb. d/d.
B-Naphthylamine.—3s. 9d. per lb. d/d.
m-Nitraniline.—4s. 2d. per lb. d/d.
p-Nitraniline.—2s. 2d. per lb. d/d.
Nitrobenzene.—5½d. per lb. naked at works.
o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.
Nitronapthalene.—10d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—4s. per lb. d/d.
p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
o-Toluidine.—10d. per lb.
p-Toluidine.—2s. 3d. per lb. naked at works.
m-Toluylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Market quiet in sympathy with general commercial depression.

Acetate of Lime.—Brown £9 10s. to £10. Quiet market. Grey, £15 per ton. Liquor, 9d. per gall. 32° Tw.
Acetone.—£73 per ton.
Charcoal.—£7 5s. to £8 10s. per ton, according to grade and locality. Fair demand.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
Wood Creosote.—2s. 9d. per gall. Unrefined.
Wood Naphtha, Miscible.—4s. 3d. per gall. Only moderate market. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P.
Wood Tar.—£4 per ton. Demand slack.
Brown Sugar of Lead.—£43 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 7½d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.
Arsenic Sulphide, Yellow.—2s. per lb.
Cadmium Sulphide.—4s. 4d. per lb., according to quantity.
Carbon Bisulphide.—£32 to £35 per ton, according to quantity.
Carbon Black.—6d. to 6½d. per lb., ex wharf.
Carbon Tetrachloride.—£62 to £67 per ton, according to quantity, drums extra.
Chromium Oxide, Green.—1s. 4d. per lb.
Indiarubber Substitutes, White and Dark.—5¾d. to 7½d. per lb.
Lamp Black.—£48 per ton, barrels free.
Lead Hyposulphite.—9d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£16 to £18 per ton f.o.r. London.
Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£56 to £65 per ton.

Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 6d. per lb. Dearer.
Zinc Sulphide.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£41 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 9d. to 2s. 11d. per lb., according to quantity. Ample supplies and keen competition.
Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.
Acid, Boric B.P.—Prices reduced by £5 per ton. Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4¼d. to 1s. 4⅞d. per lb., less 5% for ton lots. Market quiet.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.
Acid, Pyrogallic, Crystals.—6s. per lb. for 1 cwt. lots. 7s. 6d. per lb. for 7-lb. lots, according to quantity. Steady market.
Acid, Salicylic.—1s. 3d. to 1s. 6d. per lb., according to quantity. Supplies exceed demand.
Acid, Tannic B.P.—2s. 9d. per lb. Quiet steady demand.
Acid, Tartaric.—1s. 1d. per lb., less 5%. Very firm. Demand good.
Amidol.—9s. per lb., d/d.
Acetanilide.—1s. 7d. per lb. for quantities.
Amidopyrin.—13s. 9d. per lb.
Ammonium Benzoate.—3s. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—11s. 6d. per lb. Price lower owing to competition.
Benzonaphthol.—3s. 6d. per lb. spot. Weaker.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—10s. 6d. to 12s. 6d. per lb.
Bismuth Citrate.—10s. 3d. to 12s. 3d. per lb.
Bismuth Salicylate.—9s. to 11s. per lb.
Bismuth Subnitrate.—8s. 8d. to 10s. 8d. per lb. according to quantity.
} The price of Bismuth Metal has been raised from 5s. to 7s. 6d. per lb. Bismuth Salts have been advanced accordingly.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 2s. 1d. to 2s. 3d. per lb.; sodium, 2s. 2d. to 2s. 4d. per lb.; ammonium, 2s. 6d. to 2s. 8d. per lb., all spot. Market very firm. Prices again advanced.
Calcium Lactate.—1s. 6½d. to 1s. 8d., according to quantity. Fair demand and steady market.
Chloral Hydrate.—3s. 8d. per lb., duty paid.
Chloroform.—2s. 6d. per lb. for cwt. lots.
Creosote Carbonate.—6s. 9d. per lb. Little demand.
Formaldehyde.—£40 per ton, in barrels ex wharf.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.
Guaiacol Carbonate.—7s. 6d. per lb.
Hexamine.—2s. 4d. per lb. for cwt. lots.
Homatropine Hydrobromide.—25s. to 30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.
Hydroquinone.—4s. 3d. per lb. Nominal.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 6d. to 2s. 11d. per lb.
Magnesium Carbonate.—Light Commercial, reduced to £34 per ton net. Light pure, £46 per ton.
Magnesium Oxide.—Light Commercial, £70 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £24 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
Menthol.—A.B.R. recrystallised B.P., 43s. per lb.; June delivery. Synthetic, 22s. 6d. to 27s. 6d. per lb., according to quality. English make. Market rather easier.
Mercurials.—Fairly steady. Mercury slightly firmer. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.
Methyl Salicylate.—1s. 5½d. per lb., for ton lots.
Methyl Sulphonal.—18s. 6d. per lb. Cheaper.
Metol.—11s. per lb. British make.
Morphone and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 2d. for B.P. quality. Keen competition has brought prices down.
Paraldehyde.—1s. 2d. to 1s. 4½d. per lb., in free bottles and cases.
Phenacetin.—4s. 4d. per lb. in cwt. lots. Unsettled. Supplies exceed demand.
Phenazone.—6s. 3d. to 6s. 6d. per lb. Spot price lower than forward.
Phenolphthalein.—4s. 3d. to 4s. 6d. per lb. for cwt. lots.
Potassium Bitartrate 99/100% (Cream of Tartar).—83s. per cwt., less 2½% for ton lots.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., spot; commercial, 8d. to 8¼d. per lb., carriage paid. Slight reaction after recent advance.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—4s. 6d. per lb. In fair quantities.
Saccharin.—63s. per lb. in 50 lb. lots.
Salol.—3s. 6d. per lb., for cwt. lots. Slightly dearer.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb. From natural benzoic acid. Supplies of good quality available.
Sodium Citrate, B.P.C., 1911.—1s. 7d. to 1s. 11d. per lb., according to quantity. U.S.P. 1s. 10d. to 2s. 2d. per lb.
Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.
Sodium Salicylate.—Powder, 2s. 2d. to 2s. 4d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb. Flake, 2s. 3d. per lb. Strong demand, market firm.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1-cwt. kegs included.
Sulphonal.—13s. per lb. accepted for quantity.
Thymol.—16s. per lb.

Perfumery Chemicals

Acetophenone.—9s. 6d. per lb.
Aubepine (ex Anethol).—11s. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 1½d. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 7½d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 7½d. per lb.
Benzaldehyde free from Chlorine.—3s. per lb.
Benzyl Benzoate.—3s. per lb.
Cinnamic Aldehyde Natural.—14s. 9d. per lb.
Coumarin.—14s. 9d. per lb.
Citronellol.—22s. per lb.
Citral.—9s. per lb.
Ethyl Cinnamate.—10s. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—10s. per lb.
Geraniol (Palmarosa).—28s. 6d. per lb.
Geraniol.—9s. 6d. to 18s. 6d. per lb.
Heliotropine.—6s. 3d. per lb.
Iso Eugenol.—15s. per lb.
Linalol ex Bois de Rose.—24s. 6d. per lb.
Linalyl Acetate.—24s. 6d. per lb.
Methyl Anthranilate.—10s. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb.
Musk Ketone.—34s. 6d. per lb. Cheaper.
Musk Xylol.—9s. 9d. per lb. Cheaper.
Nerolin.—4s. 6d. per lb.
Phenyl Ethyl Acetate.—15s. per lb.
Phenyl Ethyl Alcohol.—14s. per lb.
Rhodinol.—38s. 6d. per lb.
Safrol.—1s. 8d. per lb.
Terpineol.—1s. 10d. per lb.
Vanillin.—25s. to 25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—13s. 3d. per lb.
Anise Oil.—2s. 9d. per lb. Dearer.
Bergamot Oil.—15s. 9d. per lb. Cheaper.
Bourbon Geranium Oil.—20s. per lb.
Camphor Oil.—60s. per cwt.
Cananga Oil, Java.—10s. 9d. per lb.
Cinnamon Oil, Leaf.—6d. per oz.
Cassia Oil, 80/85%.—9s. 3d. per lb.
Citronella Oil.—Java, 85/90%, 4s. 6d. per lb. Ceylon, 3s. to 3s. 2d. per lb., according to quality. Firmer with higher prices for forward delivery.
Clove Oil.—7s. 6d. per lb.
Eucalyptus Oil, 70/75%.—2s. per lb.
Lavender Oil.—French 38/40% Esters, 31s. 6d. per lb. Cheaper.
Lemon Oil.—4s. per lb. Advanced.
Lemongrass Oil.—5s. 3d. per lb. Cheaper.
Orange Oil, Sweet.—10s. 9d. per lb.
Palma Rose Oil.—15s. 3d. per lb.
Otto of Rose Oil.—Bulgarian, 42s. 6d. per oz. Anatolian, 28s. per oz.
Palma Rosa Oil.—15s. per lb. Cheaper.
Peppermint Oil.—Wayne County, 62s. 6d. per lb. Dearer. Japanese, 15s. 9d. per lb. Cheaper.
Petitgrain Oil.—9s. 9d. per lb.
Sandal Wood Oil.—Mysore, 25s. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, June 12, 1925.

THE Heavy Chemical Market has been moderately active during the past week, although the bulk of material quoted for has not been large. Prices both for Home and Continental products remain steady.

Industrial Chemicals

ACID ACETIC, 98/100% glacial, £56 to £67 per ton according to quality and packing, c.i.f. U.K. ports; 80% pure, £40 to £42 per ton; 80% technical, £39 to £41 per ton, packed in casks c.i.f. U.K. ports. Usual steady demand.

ACID BORIC.—Crystal, granulated or small flaked, £40 per ton; powdered, £42 per ton, packed in bags, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Rather better inquiry and price unchanged at about 4½d. per lb. delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 1s. 4½d. per lb. less 5%, ex store. Offered for early shipment at a fraction less.

ACID FORMIC, 85%.—Spot material unchanged at about £49 10s. to £50 per ton, ex store. Offered for prompt shipment from the Continent at £48 15s. per ton, c.i.f. U.K. ports.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—Usual steady demand, quoted £23 15s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Quoted 3¾d. per lb., ex store, spot delivery. Offered from the Continent at about 3½d. per lb., c.i.f. U.K. ports.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In moderate demand and price unchanged at about 1s. per lb. less 5%, ex store. Offered for prompt shipment at a fraction less.

ALUMINA SULPHATE 17/18%, IRON FREE.—Quoted £6 15s. per ton, ex store. Spot delivery. Offered for prompt shipment from the Continent at about £6 5s. per ton, c.i.f. U.K. ports.

ALUM, LUMP POTASH.—Quoted £8 per ton, c.i.f. U.K. ports, prompt shipment from the Continent. Powdered quality, 5s. per ton less. Spot lots quoted £9 5s. per ton, ex store.

AMMONIA ANHYDROUS.—Unchanged at 1s. 4½d. per lb., ex station, containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton. Powdered, £39 per ton. Packed in 5 cwt. casks delivered U.K. ports.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantities.

AMMONIA MURIATE.—Grey galvaniser's crystals of English manufacture quoted £28 10s. per ton, ex station. Offered from the Continent at about £24 10s. per ton, c.i.f. U.K. ports. Fine white crystals on offer at £19 15s. per ton, c.i.f. U.K. ports.

ARSENIC.—Refined white Cornish unchanged at £26 per ton, ex store, spot delivery. Offered for prompt despatch from works at about £25 per ton, ex wharf. Cheap offers of foreign arsenic at about £23 per ton, c.i.f. U.K. ports.

BARIUM CARBONATE, 98/100%.—Quoted £7 10s. per ton, c.i.f. U.K. ports, prompt shipment.

BARIUM CHLORIDE, 98/100%.—In little demand and price unchanged at about £10 5s. per ton, ex store, for English material. Offered from the Continent at about £8 10s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots quoted £10 10s. per ton, ex station. Contracts, 20s. per ton less.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £24 10s. per ton. Crystals, £25 per ton. Powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental on offer at about £3 15s. per on, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks free.

COPPER SULPHATE.—Quoted £24 10s. per ton, f.o.b. U.K. ports for export. Continental available at about £23 per ton, ex store.

FORMALDEHYDE 40%.—Spot material unchanged at about £40 per ton, ex store. Offered for early shipment at £39 per ton c.i.f. U.K. ports.

GLAUBER SALTS.—Fine white crystals of English manufacture quoted £4 per ton, ex store or station. Continental material on offer at about £3 per ton, c.i.f., U.K. ports.

LEAD, RED.—Imported material unchanged at about £42 to £42 10s. per ton, ex store. Offered from the Continent at about £39 10s. per ton, c.i.f. U.K. ports.

LEAD, WHITE.—Quoted £43 per ton, ex store, spot delivery.

LEAD ACETATE.—White crystals offered from the Continent at £43 10s. per ton, c.i.f. U.K. ports, prompt shipment. Brown quality quoted £37 per ton c.i.f. U.K. ports. White crystals offered for spot delivery at £44 10s. per ton, ex store.

LEAD NITRATE.—Quoted £42 to £42 10s. per ton, ex station. Offered from the Continent at about the same price.

MAGNESITE, GROUND CALCINED.—Usual steady demand and prices unchanged at about £8 per ton, ex station.

MAGNESIUM CHLORIDE.—Unchanged at about £3 5s. per ton, c.i.f. U.K. ports; spot material quoted £3 15s. per ton, ex store.

POTASH CAUSTIC, 88/92%.—Unchanged at about £29 per ton, ex wharf, prompt shipment from the Continent. Spot material available at about £30 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Price for home consumption 5d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Unchanged at about £25 10s. per ton, c.i.f. U.K. ports. Spot material quoted £26 per ton, ex store. 90/94% quality quoted £23 10s. per ton c.i.f. U.K. ports; 80/85% hydrated quality quoted £21 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE.—Rather more available from the Continent quoted 3¾d. per lb., c.i.f. U.K. ports; spot material on offer at about 4d. per lb., ex store.

POTASSIUM NITRATE, SALTPETRE.—Refined granulated, 99%, quoted at about £28 per ton, ex store. Quoted £24 10s. per ton, c.i.f. U.K. ports for prompt shipment from the Continent.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—On offer at 7½d. per lb., ex store. Offered for prompt shipment from the Continent at about 7¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—In little demand, nominally 7¼d. per lb., ex store, but obtainable at slightly less for larger quantities.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 12s. 6d. per ton; broken, 60%, £17 2s. 6d. per ton; powdered, 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material quoted £21 per ton, ex store. Offered for prompt shipment from the Continent at about £19 per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM CARBONATE, SODA CRYSTALS.—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Commercial quality offered from the Continent at £8 5s. per ton, c.i.f. U.K. ports. English material unchanged at £9 10s. per ton, ex station. Pea crystals, £14 per ton, ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 7s. 6d. per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Offered from the Continent at about £22 per ton, c.i.f. U.K. ports; spot material quoted £24 10s. per ton, ex store.

SODIUM PRUSSIATE, YELLOW.—In moderate demand and price unchanged at about 4d. per lb., ex store.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English manufacturers quote: 60/62% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more; crystal, 31/34%, £9 5s. per ton, carriage paid U.K. stations, minimum 4 ton lots, with slight reduction for contracts over a period; 60/62% solid offered from the Continent at about £10 15s. per ton, c.i.f. U.K. ports; broken £1 per ton more; 30/32% crystals, £8 5s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton. Prices nominal, ex store.

ZINC CHLORIDE 97/98%.—Continental manufacture quoted £23 per ton, c.i.f. U.K. ports. English material for export on offer at about £25 to £26 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Commercial crystals on offer from the Continent at about £12 per ton, c.i.f. U.K. ports.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

The Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, June 12, 1925.

Conditions on the chemical market here following the Whitsuntide break, which in Manchester amounts in effect practically to a complete stoppage of serious business during the whole of the week, has been patchy. Some firms report a fair volume of inquiry, but not all of them, and on the whole actual business has been quiet, and, as has for some time been the case, confined principally to small lots for early delivery. This applies pretty well to overseas as well as trade on home account.

Heavy Chemicals

Hyposulphite of soda is in moderate request, with values fairly steady at round £14 per ton for photographic crystals and £9 5s. for commercial quality. Saltcake is a dull section of the market, and prices are weak at £3 12s. 6d. to £3 15s. per ton. Glauber salts are about unchanged from recent levels at £3 10s. per ton, but here also business is on a small scale. Soda crystals keep steady and in fair demand at £5 5s. per ton. Caustic soda meets with a moderate amount of inquiry, and quotations continue firm at from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76–77 per cent. Prussiate of soda is steady although not too active at 3⅞d. to 4d. per lb. Phosphate of soda is still quiet and easy at about £12 10s. per ton. The demand for bleaching powder is on a comparatively small scale, but prices are unchanged at £9 10s. per ton. Sulphide of sodium is quoted at about £13 15s. per ton for 60–65 per cent. concentrated and £9 10s. for crystals without receiving much attention from buyers. Sodium chlorate meets with a moderate inquiry, and prices are well held at 3d. per lb. Acetate of soda is quiet at £19 to £20 per ton. Bicarbonate of soda is about unchanged at £10 10s. per ton, but demand is rather dull. Alkali is steady and in fair request at round £6 15s. per ton. Bichromate of soda is still quoted at 4d. per lb., and a moderate amount of business is being put through.

The demand for both caustic potash and carbonate of potash keeps on modest lines, although values are maintained. Caustic is quoted at round £30 per ton, and carbonate at £24 10s. to £25. Prussiate of potash is in moderate request at 7d. per lb. Permanganate of potash is rather quiet, with values steady at 6¼d. per lb. for commercial quality and 7¾d. for B.P. Chlorate of potash is steady and in fair demand at round 3¼d. per lb. Bichromate is still quoted at 5d. per lb.

Arsenic still fails to show any indication of improving demand, and prices are very weak; white powdered, Cornish makes, is on offer in Manchester at about £25 per ton. Sulphate of copper keeps fairly steady, although business is on a limited scale; current values are round £24 10s. per ton. Nitrate of lead is quiet but fairly steady at £41 per ton. Acetate of lead is in limited request at £45 per ton for white and £39 to £40 for brown. Acetate of lime is slow and easier at £14 10s. per ton for grey material and about £9 for brown. Epsom salts are well held at recent rates though business is not too active; commercial quality is quoted at £4 5s. to £4 10s. per ton and pharmaceutical at round £6.

Acids and Tar Products

Oxalic acid is selling slowly, although recent price levels are maintained, about 3¾d. per lb. being quoted. Acetic acid is in fair inquiry at round £39 per ton for 80 per cent. commercial and £67 for glacial. Citric acid meets with a quietly steady demand at about 1s. 4½d. per lb., with tartaric acid steady at round 1s.

Most lines in the coal-tar products section are devoid of movement. Pitch is dull but nominally unchanged at about 41s. per ton. Creosote oil is quiet at 6d. per gallon. Little interest is being shown in carbolic acid and values are easy, crystals offering at 4½d. per lb. and crude at 1s. 6d. per gallon. Solvent naphtha is in limited demand at 1s. 5d. per gallon. Naphthalenes are quiet and easy at £14 for refined and £4 5s. and upwards for crude.

American Market Movements

(From *Drug and Chemical Markets*).

Changes in heavy chemicals are slight and the market remains quite steady. Arsenic is firmer. Acetic acid is lower. Barium salts continue weak.

Fine chemicals show little change in price, but trading is on a sound basis and is reported to be good with first hands. Codliver oil and quicksilver are much stronger.

Light oil distillates virtually unchanged, except 90 per cent. benzene which is stronger. Toluene and solvent naphtha are available for immediate delivery. Demand for intermediates steady but routine.

Vegetable oils remain quiet although prices are steady. Linseed oil and chinawood oil unchanged. Animal oils moving satisfactorily.

Elmore Process for Complex Ores

Now a Commercial Proposition

The Ordinary General meeting of the Chemical and Metallurgical Corporation, Ltd., was held on Tuesday in London.

Mr. Herbert Guedalla (chairman of the company), in moving the adoption of the report and accounts, said: When our company was formed, just six years ago, for the purpose of developing this invention of Mr. Frank Elmore for the treatment of complex ores by chemical process, we little thought that we would have to wait so long before our experts could advise us that this important invention could be considered a commercial success. We have always felt that the main idea of the process was correct and that it was merely a question of time to assimilate various mechanical detail in order to make it workable on an important scale. We have had to exercise considerable patience, and I am thankful to say now that we cannot consider that time has been wasted, because the process as it stands to-day, with the improvements which have been made and the side issues which have been explored, is very different from that on which we started. Our experts have advised that the mechanical difficulties of working the Elmore process on a large scale have now been overcome, and that such progress has been made in other directions outside the immediate scope of the original process that they are justified in stating that an industrial business can be developed on a large scale. We have come to a point, therefore, when we have to consider an alteration in the main policy of our undertaking.

It is our intention to build up our business on commercial lines and not merely to rely on royalties receivable from those using the process. This decision necessitates a complete reorganisation of our capital. The Chairman then referred to the proposed scheme details of which appear in our "Company News" (p. 597).

Scheme Authorised

If this scheme of reorganisation is approved, said the Chairman, we are advised that we shall have sufficient working capital for the purpose of developing our process as a commercial undertaking, at any rate as far as the first large unit is concerned. Many important questions will arise, more especially as to the exact locality in which this unit should be located. The Stratford works have served their purpose and may still be useful, but it is obvious that great economies can be effected by working a plant in a place better situated for the marketing of our products. The responsibility for organising such an industrial enterprise on the right lines from the beginning is a grave one and will occupy a great deal of individual time and attention; it will also require experience in working from a commercial point of view. Your directors have felt that they should invoke other assistance, and I trust that we shall be able to announce within a short period that a gentleman well known for his business capacity and commercial ability will consent to accept the position of chairman and managing director of our company.

At a subsequent extraordinary general meeting and at separate meetings of the holders of ordinary shares and preference shares, the necessary resolutions to carry the scheme of reorganisation into effect were unanimously approved.

Company News

SHAWINIGAN WATER AND POWER CO.—A dividend of 1¾ dol. per share on the common shares is announced for the past quarter.

HARRISON, BARBER AND CO.—An interim dividend is announced of 5 per cent. per annum, less tax, on the ordinary shares for the half-year, payable on July 2.

SIAMESE TIN SYNDICATE.—A second interim dividend of 10 per cent. (2s. per share), less tax at 3s. 9d. in the £ in respect of the current year, is payable on June 30.

AMERICAN CYANAMID CO.—A dividend of $1¼ per share has been declared on the preferred stock, and $1 per share, plus $½ extra, on the common stock, payable on July 1.

SANITAS COMPANY.—The net profits for the year ended March 31 were £44,233, and £4,556 was brought forward. A final dividend of 10 per cent. is proposed on the ordinary shares, making 25 per cent. for the twelve months, adding £7,966 to the reserve (making that fund £50,000), and carrying forward £1,170.

INTERNATIONAL NICKEL CO.—The operating profit for the year ended March 31, 1925, was $4,248,878, and the net profit was $2,924,057.94, compared with $1,206,786.67 for the preceding year. After payment of preferred dividends, amounting to $534,756, the surplus on March 31, 1925, was $13,139,143.44, an increase of $2,389,301.94. Four dividends of 1½ per cent. each on preferred stock have been paid during the year. No dividends were paid on the common stock.

UNITED WATER SOFTENERS, LTD.—The trading profit for 1924 totalled £17,230, and after making provision for taxation and the preference dividend, and including the balance of £1,340 brought in, the available total is £13,034. Dividends of 2s. on the "A" shares and 9s. 9·33d. on the "B" shares are proposed, both free of tax; £2,603 is placed to reserve, bringing that account up to £6,000; and £1,542 is carried forward. A year ago similar dividends were paid, but the accounts then covered a period of eighteen months.

SAN SEBASTIAN NITRATE CO.—The accounts for the year 1924 show a gross profit of £18,535. After deducting provision for amortisation of grounds and depreciation of plant and machinery, £5,300, there is £13,235. Reserve for British income-tax and corporation profits tax, Chilean income-tax, London office charges, and interest and discount absorb £5,567, leaving a net profit of £7,668, and the balance brought forward was £5,948, making £13,616. The directors recommend a dividend of 5 per cent, less tax, at 4s. 6d. in £, carrying forward £8,046.

UNITED PREMIER OIL AND CAKE CO., LTD.—The report of the directors for the year 1924 states that the net profit amounted to £97,632. Interest on debenture stock to December 31 last absorbed £22,444, and £10,000 is reserved for contingencies, leaving £65,188, which, with the amount brought forward of £20,723, makes a total of £85,911. The sum of £34,431 was absorbed by the dividend on the preference shares to December 31, 1924, leaving a balance of £51,480. The directors recommend a dividend of 6 per cent., less tax, on the ordinary shares, requiring £34,875, leaving a balance of £16,605 to be carried forward.

ANTOFAGASTA NITRATE CO.—The net profit for 1924 amounted to $22,346,700, compared with $20,826,117 for the preceding year. To this is added the contingencies fund of $1,500,000 brought forward, and the dividend fund of $1,500,000, while stoppage expenses and expenses on surveys and explorations, totalling $1,481,361, are deducted, leaving an available balance of $23,865,339. Dividends paid during the year absorbed $13,440,000; $7,005,339 has been transferred to oficinas sinking fund, against $3,692,029; and $1,500,000 has been again placed to contingencies fund. The dividend fund receives $1,920,000 against $1,500,000 a year ago.

ABERTHAW AND BRISTOL CHANNEL PORTLAND CEMENT.—The report for twelve months ended March 31, 1925, states that balance brought forward was £68,476, and the profit for year £82,193, making £150,669. Interest on debenture stock for year took £12,744, debenture stock sinking fund instalment £2,500, interim dividends on preference and ordinary shares £24,375, leaving £111,049. The directors recommend a final dividend on the preference, making 7½ per cent., and a final dividend of 6½ per cent. on the ordinary shares, less tax, making 12½ per cent. for the year, placing to reserve £20,000, and carrying forward £65,424.

CHEMICAL AND METALLURGICAL CORPORATION.—A circular has been issued by the directors in which they propose a scheme for reduction of capital and reconstruction. Proposals are also made for the provision of £150,000 new capital for the erection of a first commercial unit at some seaboard point either in England or Belgium, the present works at Stratford being unsuitable. It is proposed to write 19s. off each of the one million £1 ordinary shares, and the resultant 1s. shares are to be consolidated into 2s. shares. Thus every holder of two £1 ordinary shares will receive one new ordinary share of 2s. in the reduced capital. Holders of the 200,000 £1 5 per cent. cumulative preference shares are asked to waive the arrears of dividend in consideration of an increase in the rate of dividend to 8 per cent. per annum. To provide the above-mentioned new capital an issue of 1,500,000 new ordinary shares of 2s. each has been underwritten, 1,000,000 of which are offered to shareholders at par. The necessary resolutions to carry the above scheme into effect were unanimously approved at an extraordinary general meeting on Tuesday.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up till July 3, 1925.

"DUCO."

453,954. For chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. Brown Bros., Ltd., 22 to 34, Great Eastern Street, London, E.C.2; manufacturers and merchants. November 25, 1924.

"PACO."

453,349. For asphaltum and bitumen. Class 4. Franz A. Pabelick and Co., Kaiser Wilhemstrasse 20 to 36, Hamburg, Germany; manufacturers. November 6, 1924. (To be Associated. Sect. 24.)

Opposition to the Registration of the following Trade Marks can be lodged up to July 10, 1925.

"SMOOTH-ON."

454,961. For a metallic compound, in powder form, for repairing defects in iron and other metallic structures. Class 1. Smooth-on Manufacturing Co. (a Corporation organised under the laws of the State of New Jersey, United States of America), 570 to 574, Communipaw Avenue, Jersey City, Hudson County, State of New Jersey, United States of America, manufacturers. January 2, 1925.

"BITUPLASTIC."

457,069. For chemical substances used in manufactures. Class 1. Wailes Dove Bitumastic, Ltd., 5, St. Nicholas Buildings, Newcastle-on-Tyne, manufacturers. March 11, 1925. (To be Associated. Section 24.)

"PROOFOL."

458,484. For a chemical compound to be used as a dressing for concrete or other similar surfaces to render them waterproof. Class 1. William Edward Woodward, 66, Glisson Road, Cambridge, university lecturer. April 30, 1925.

"TYNOS."

456,087. For disinfectant fluids. Class 2. Richard Ernest Brett, trading as Brett's Oil Co., 90, Pilgrim Street, Newcastle-on-Tyne, Northumberland, oil and grease manufacturer. February 9, 1925.

"NODORITE."

458,061. For disinfectants and deodorisers. Class 2. J. Lyons and Co., Ltd., Cadby Hall, Hammersmith Road, Kensington, London, W.14, purveyors and caterers. April 14, 1925.

"SOLIC."

457,754. For oils, for use in tanning. Class 4. Sterns, Ltd., 16, Finsbury Square, London, E.C.2., oil refiners, grease and lubricator manufacturers. April 2, 1925.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry make no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

LONGFELLOW, T. D. (trading as LEIGHTON PASTE WORKS), 20, Leighton Street, Leeds, paste manufacturer. (C.C., 13/6/25.) £14 2s. 4d. April 29.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

Satisfactions

CLOVER PAINT AND COMPOSITION CO., LTD., Liverpool. (M.S., 13/6/25.) Satisfaction registered May 26, £10,000, part of amount registered May 5, 1924.

WILLOWS, FRANCIS, BUTLER AND THOMPSON, LTD., London, E., druggists. (M.S., 13/6/25.) Satisfactions registered May 26, £10,000, registered March 31, 1904; £11,000, registered August 21, 1919; and £700, balance of amount registered August 29, 1919.

Receivership

REXEAN, LTD. (R., 13/6/25.) J. H. Ward, of Adelphi Chambers, 30, Hoghton Street, Southport, Incorporated Accountant, was appointed receiver and manager, on May 29, 1925, under powers contained in mortgage debentures dated November 4, 1924.

London Gazette

Companies Winding Up Voluntarily

DR. PARKER'S OINTMENT CO., LTD. (C.W.U.V., 13/6/25.) By special resolution, May 13; confirmed, May 28; P. Alexander, Incorporated Accountant, 43, Chancery Lane, W.C., appointed liquidator.

SOLOMIA (1922), LTD. (C.W.U.V., 13/6/25.) By resolution passed June 3.

New Companies Registered

ADHESIVE LUBRICANTS, LTD. Manufacturers, importers and exporters of and dealers in all kinds of merchandise, general produce, oils, fats, greases, and waste matter of vegetable, animal and mineral origin, etc. Nominal capital, £1,500 in 1,495 5 per cent. cumulative preference shares of £1 each and 100 founders' shares of 1s. each. Solicitors: Tucker and Jenkins, Paignton.

ANGLO-AMERICAN ASPHALT CO., LTD., Clare House, Kingsway, London. Manufacturers, importers and exporters of and dealers in all kinds of asphalt, bitumen, oil and coal tar products, etc. Nominal capital, £1,000 in £1 shares.

CLAN PRODUCTS, LTD., 193, Broomloan Road, Govan, Glasgow. Manufacturing chemists, drysalters, etc. Nominal capital, £4,000 in £1 shares.

FERTILISER SALES, LTD. Manufacturers, importers, exporters and producers of, agents for, and dealers in sulphate of ammonia, nitrate of soda, potashes, bone and mineral phosphates, etc. Nominal capital, £20,000 in £1 shares.

GREEFF-CHEMICALS (MANCHESTER), LTD., Parsonage Chambers, 3, Parsonage, Manchester. To act as agents for R. W. Greeff and Co., Ltd., for the sale of chemicals and other products. Nominal capital, £5,000 in £1 shares.

GREEFF DYESTUFFS (MANCHESTER), LTD., Trinity House, 119, Chapel Street, Salford, Manchester. To act as agents for R. W. Greeff and Co., Ltd., for the sale of dyestuffs, colours, and similar articles. Nominal capital, £5,000 in £1 shares.

J. C. MITCHELL, LTD. Manufacturing, wholesale, retail, consulting, analytical and dispensing chemists and druggists, etc. Nominal capital, £500 in £1 shares. Solicitor: C. H. Kirby, 20, Red Lion Square, High Holborn, London.

MODY AND CO., LTD., 312, Deansgate, Manchester. Manufacturing chemists, druggists, drysalters, oil and colourmen, etc. Nominal capital, £2,000 in £1 shares.

PALATINE CHEMICAL CO., LTD., 161, Penny Street, Blackburn. Manufacturers of and dealers in drugs, chemicals, etc. Nominal capital, £300 in £1 shares.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

TAR MACADAM.—Tenders invited for the supply of 500 tons of 2½ in. and 200 tons of 1 in. tarred slag macadam, best quality, for Carshalton District Council. Tenders to Chairman, c/o Mr. C. P. Lovelock, The Grove, Carshalton, by June 23.

RED AND WHITE LEAD.—Tenders invited for the supply of lead, red and white, soft soap, and tallow for Leeds Gas Committee. Town Clerk, 20, Great George Street, Leeds, by June 20.

OILS.—The Directorate of State Railways of Jugo-Slavia is inviting tenders to be presented in Belgrade by June 13 for the supply of 442,500 kilogs. of engine and wagon grease, for winter use; 378,500 kilogs. of engine and wagon grease, for summer use; 255,150 kilogs. of cylinder petroleum; 383,000 kilogs. of cylinder petroleum for superheated steam; 896,000 kilogs. of petroleum for driving Diesel motors; 155,850 kilogs. of petroleum for illuminating signals; 10,800 kilogs. of dynamo-petroleum; 456,700 kilogs. of doubly refined petroleum, and 156,000 kilogs. of benzine. Further particulars can be obtained. (Reference No. B.X. 1828.)

CHINA CLAY AND PORCELAIN COLOURS.—An agent in Paris is desirous of representing British firms for the sale in France of the above goods. (Reference No. 706.)

OIL SEEDS.—An agent in Genoa desires to secure the representation of British exporters of oil seeds. Corresponds in English. (Reference No. 708.)

Tariff Changes.

GERMANY—SWITZERLAND.—An agreement provides for the following increased contingents on goods imported into Germany from Switzerland (for the period June 1 to September 30)—sugar, ex. molasses, 200 quintals; cement, 100,000 quintals; calcium carbide, 50,000 quintals; ferro-silicon, 10,000 quintals; cyanamide of lime, 35,000 quintals; celluloid, 300 quintals.

JAPAN.—Certificates of origin on goods imported into Japan are at present necessary for soaps, perfumed oils, fats, etc., and olive oil.

ROUMANIA.—New export duties include ozokerite crude (ceresine), 4 lei per kilog.; light oils, including Vulcan oil, unrefined, 1,000 lei per wagon; heavy oils, unrefined, 3,000 lei per wagon; heavy oils, refined, 5,000 lei per wagon; oil of tar (creosote), 1,000 lei per wagon; articles of artificial silk, 1 lei per kilog.; special steels, 2 lei per kilog.; mercury, 30 lei per kilog.; zinc, sulphurous, 500 lei per wagon; carbide, 5 lei per 100 kilogs. Note.—All the above goods are exempt from commission tax.

TRIPOLITANIA AND CYRENAICA.—A Decree authorises, for the remainder of the current year, the duty-free importation of denatured petroleum for agricultural purposes, provided that importation is effected through the Custom Houses of Tripoli, Bengasi and Derna, and that local government conditions are observed.